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Military Transport

IN INDIA

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BY

CAPTAIN W. WICKHAM,

ASSISTANT COMMISSARY GENERAL.

Bombay:
PRINTED AT THE "TIMES OF INDIA" STEAM PRESS.

1892.

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PREFACE.

DURING the last ten years the Author has collected a number of notes and memoranda grouped under various headings, as an aide-memoire when instructing Transport Classes.

The following lectures are an expansion of these notes, arranged in suitable sequence, and are in the first place intended to reduce the labour of Instructors when teaching training classes at Transport Depôts.

It may be justly argued that the contents of this book are more than a Non-Commissioned Officer or Private can be expected to master during his six weeks' course at a training depôt ; but as the details discussed have in almost every instance come under the Author's personal notice when performing transport duties, it may be fairly claimed that the lectures are well within the scope of a Transport Officer's work, which includes the care and management of the different transport animals used under varying conditions of climate and locality.

The published price of the lectures represents the actual cost of printing, binding and publishing. It is hoped that the book will thus be placed within the reach of every soldier, and that the contents are interesting enough to induce officers and men to study them when they return to their regiments on conclusion of their training. They will also have a book of reference ready at hand, should they be required for transport work on Field Service.

The book has been interleaved, so that all corrections and additions may be recorded as they appear in Indian Army Circulars.

P. S.

The "**Short Manual on Transport Training and the Management of Regimental Transport**" published by the Author in 1888 met with a ready sale, and he has now endeavoured to afford practical information on almost every subject bearing on the general question of Indian Military Transport. In publishing so comprehensive a work, he was further influenced by the fact that Officers, Non-Commissioned Officers, and Agents when joining the Commissariat-Transport Department require a practical Hand-book to assist them in learning their transport duties.

An abridged translation of the lectures printed in the Urdu and Hindi characters of the Hindustani language will shortly appear.

It is hoped that all assistance obtained from works already published has been duly acknowledged.

POONA, W. W.

September 1892.

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Increased Scale of Pay and Clothing to Mule Attendants from 1st November 1892.

While the Lectures have been in the press an intimation has been received that the Government of India has sanctioned the following increased scales of pay and clothing to mule attendants; the pay to be increased from the 1st November 1892.

Orders will consequently appear in Indian Army circulars, and it will be necessary to correct the scales of pay and clothing detailed in pages 128—131 of this book.

Pay of drivers to be raised from Rs. 6 to Rs. 7 per mensem.
„ daffadárs „ „ „ 8 to „ 10 „
„ jemadárs „ „ „ 10 to „ 12 „

Clothing to be issued as follows to the above ranks :—

	Old scale.	*New scale.*
Belt, Leather	1 every 6 years	1 every 6 years.
Blouse, Khaki Drill	1 „ 2 „	1 annually.
Pyjamah, Cotton (trousers)	Nil.	1 pair annually.
Blanket, Country	Nil.	1 every 2 years.
Haversack	Nil.	1 every 3 years.
Puttis	Nil.	1 pair annually.
Shoes, hobnailed	1 pair annually	1 „
Pagri	1 annually	1 annually.

Daffadárs will also receive chevrons, and jemadárs a belt of " Sam Brown " pattern and a sword.

Erratum.

On page 129 in the fifth line from the bottom after " (Commissariat-Transport form) " add " No. 13." In the fourth line from the bottom after " pension" add " see also page 220."

Addendum.

On page 185, line 20, after " boxes on the saddle," add—

" Lee-Metford ball ammunition, 1,100 rounds in a box, weight about 85 lbs."

The New Commissariat-Transport Field Service Code of 1892 has been distributed since the publication of "Military Transport in India," and the following corrections and notes are now necessary.

Page 7.—All the Sections and Sub-Sections quoted from the old Commissariat Field Service Code apply to the new Code.

„ 8.—Sections and Sub-Sections quoted in lines 4 to 10 apply to the new Code.

„ Erase Lines 12 to 14, and substitute "The following Appendices in the new Field Service Code are important to Transport Officers :—Nos. 11, 12, 13, 16 Section VI., 38, 39, 41, 45, 47, 48, 51."

„ The Field Service Forms quoted in lines 15 to 17 hold good for the new Code and in addition Field Commissariat Form No. 33.

„ 37.—Line 9—The correct reference in the new Commissariat-Transport Field Service Code is Appendix 47.

„ 42 „ 9 „ „ „ „ „ „ „ 29, Table H, Note A.

„ „ 29 „ „ „ „ „ „ „ 47.

„ 48 „ 39 „ „ „ „ „ „ „ „

„ 51 „ 31 „ „ „ „ „ „ „ „

„ 56 „ 12 „ „ „ „ „ „ „ „

„ 113 „ 17 „ „ „ „ „ „ „ 48.

„ „ „ 19 „ „ „ „ „ „ paras. 648 to 660.

„ 119 „ 30 „ „ „ „ „ „ Section III., Sub-Section V.

„ 124 „ 37 „ „ „ „ „ „ para. 127.

„ 125 „ 30 „ „ „ „ „ „ Section II., Sub-Section V.

„ 129 „ 2 „ „ „ „ „ „ Section II., Sub-Section IV., paras. 101 to 105, and Appendix 11.

„ „ „ 45 „ „ „ „ „ „ Section XII., Sub-Section VIII.

„ „ „ 50 „ „ „ „ „ „ Section II., Sub-Section VII, and paras. 133, 134.

„ 130 „ 41 „ „ „ „ „ „ Section VI., Sub-Section I.

„ 133 „ 43 „ „ „ „ „ „ paras. 115, 116, 144.

„ „ „ 45 „ „ „ „ „ „ Section III., Sub-Section III., and paras. 188, 189.

„ 134 „ 8 „ „ „ „ „ „ para. 248.

„ 137 „ 3 „ „ „ „ „ „ paras. 556, 557, 558.

„ 148 „ 41 „ „ „ „ „ „ Appendix 24, Tables D and E, Appendix 29, Table H.

„ 169.—Opposite line 41 insert "also referred to in Section VIII., Sub-Section X., New Commissariat-Transport Field Service Code."

„ 175.—Line 23—The correct reference in the new Commissariat-Transport Field Service Code is para. 303.

„ 190 „ 27 „ „ „ „ „ „ Appendix 51.

„ 210 „ 25 „ „ „ „ „ „ Section VIII., Sub-Section XIII.

„ 214 „ 34 „ „ „ „ „ „ paras. 795, 797.

„ „ last line „ „ „ „ „ „ Section VIII., Sub-Section III.

„ 225.—Line 32 „ „ „ „ „ „ Section VIII., Sub-Seotion VI.

„ „ „ 34 „ „ „ „ „ „ Section XI., Sub-Section VI.

„ 226 „ 2.—Erase "No. 8" and after "supplied" add "In the New Field Service Code, Form 22 is used for this purpose."

„ „ Lines 12 and 13.—Place the words "ration indents excepted" in parenthesis, and add "also used for receipts."

„ „ Erase lines 20 to 24 and substitute "Commissariat-Transport Field Service Form No. 38 (new Field Service Code).—Invoice of Transport Animals admitted into and discharged from hospitals."

„ 231.—Lines 4 and 5.—The correct reference in the new Commissariat-Transport Field Service Code is Section VIII., Sub-Section V.

„ „ The table of ambulance carriage allowed to Corps on Field Service requires correction in the following items (*vide* Commissariat Field Service Code, Section VIII., Sub-Section V.) :—

(*a*) Each Regiment of Native Cavalry and Native Infantry is now allowed *two* field dándies with chágals and 12 bearers instead of *one* dándi and six bearers as formerly allowed. Wings are still allowed one Field dándi with chágals.

(*b*) The following is the new distribution of Field Stretchers to Regiments of Cavalry and Infantry on Field Service :—

British Cavalry, each Regiment 4 Field Stretchers.
„ „ Wing 2 „
„ „ Squadron 1 „
Native Cavalry.—The same as for British Cavalry.

British Infantry, each Battalion 4 Field Stretchers.
„ „ Wing 2 „
Native Infantry.—The same as for British Infantry.

Corrections to "Military Transport in India." List No. 2.

Page 26.—Eliminate line 36 and line 37 to "960 lbs." and substitute "The authorised loads for elephants are detailed in para. 1791, vol. V, amended by I. A. C. 67 of 1893,—

	Lbs.		Maunds.
Large elephants carry	1,200	or	15
Medium " "	960	"	12
Small " "	800	"	10"

Page 42, *line* 3.—After "loins" add "a list of tools allowed for palán-makers will be found in Appendix 51 of the Field Service Commissariat Transport Code."

Page 121, *line* 10.—After "percentage" add "Special Casting Committees may also be held under the provisions of para. 1959-A, vol. V, as ordered by I. A. C. 67 of 1893."

Page 131, *line* 14.—After "expected" add "The scales of pay and clothing have since been increased, *vide* correction slip on page XI immediately before lecture I."

Page 133, *line* 39.—After "apprehension" add "Desertions and deaths will be reported to the C. C. O. by letter, the general register number of the men being given (*vide* para. 1866, vol. V, amended by I. A. C. 67 of 1893)."

Page 136.—Opposite lines 4 to 12 note as follows :—

"Paras. 1912 and 1913, vol. V, have been reconstructed by I. A. C. 67 of 1893, and transport and siege train bullocks are now to be branded—

On near hind quarter—Last two figures of the year of purchase.

On off hind quarter—The initial letter or letters of the station of purchase and register number of the station of purchase.

Bullocks supplied from the Hissar Farm are branded as shown in para. 1968, vol. V."

Page 149.—Opposite line 1 note as follows :—

"The issues and renewals of carts, saddlery and gear are now regulated by vol. V, paras. 1833, 1906, 1930 and 1931, all reconstructed by I. A. C. 67 of 1893."

line 7.—After "revision" add "(amended by I. A. C. 67 of 1893)."

Page 150, *line* 10.—After "vol. V," add "see vol. V, appendix 60, sanctioned by I. A. C. 67 of 1893."

Page 151, *line* 11.—For "2046" substitute "1936-A," and in line 12 eliminate from "a slight increase" to the end of the line.

line 14.—After "Commissariat" insert "and Ordnance."

line 30.—After "1st December" add "(see para. 1833, vol. V, amended by I. A. C. 67 of 1893)."

Page 154, *line* 23.—After "backs" add "Para. 2044, vol. V, gives the proportions in which these sizes should be indented for (I. A. C. 67 of 1893)."

Page 161.—In line 12 after "8 maunds" add "on field service, and 10 maunds on ordinary duties or on the march."

In line 13 after "10 maunds" add "(vol. V, para. 1791, amended by I. A. C. 67 of 1893)."

Page 162.—Opposite lines 17 to 33 note " Para. 1907, reconstructed by I. A. C. clause 67 of 1893, gives an amended classification of army transport carts."

Page 172, *line* 34.—Eliminate "12 to 15 maunds " and substitute "10 to 15 maunds according to class (see page 26 and also para. 1791, vol. V)."

line 40.—After " 40 lbs." add " (in Assam 60 lbs.)"

line 41.—Eliminate "8 maunds" and substitute "10 maunds or 800 lbs. on ordinary duties or route march, and 8 maunds or 640 lbs. on field service."

Page 201, *line* 42.—After "repairs" add "see vol. V, paras. 1905 and 1906 (amended by I. A. C. 67 of 1893), which deal with repairs to carts."

Opposite the last three lines note " Para. 1935, vol. V, has now been reconstructed by I. A. C. 67 of 1893, and lays down the procedure for extensive repairs to saddlery and line gear."

Page 208, *line* 31.—After " service" add " (para. 2096, vol. V, amended by I. A. C. 67 of 1893)."

Page 228, *line* 41.—After "war" add " The increased scales of pay and clothing sanctioned for mule drivers do not yet apply to ambulance bearers who receive pay and clothing on the old scales."

Page 229.—Opposite the first para. note as follows :—

" Dándis, chágals, and stretchers should be taken with regiments and batteries when they move on relief, except when proceeding to England or the Colonies, when they should be handed over to relieving Corps or to the Commissariat Transport Department (G. O. No. 71, dated Simla 31st August 1892)."

Page 231, *line* 2.—After "required" add " For rules for supply of bearers and ambulance carts and tongas see paras. 2105, 2108 and 2109, vol. V, amended by I. A. C. 67 of 1893."

"Military Transport in India."

Correction List No. 3.

Page 120, *line* 30—For " and " substitute " to."

Page 121, *line* 9.—For " 1857 and 1858 " substitute " 1957 and 1958."

Page 133.—After line 15 add—" para. 1897, vol. V, A. R. I., quotes the documents and entries in service books which are necessary when Transport attendants claim their discharge or are discharged for misconduct."

Page 138—After line 33 add—" amended para. 1915, vol. V, A. R. I., directs that Transport Officers should from time to time examine the marks and brands of all animals in their charge, comparing the animals and their markings with the description and markings given in the descriptive rolls, and in cases where brand marks have become illegible, they should be renewed, but only to the extent found absolutely necessary to make the marks legible.

Page 183.—Opposite " Indian followers" add—

" On special occasions General Officers Commanding are empowered to sanction the carriage of 6 lbs. extra kit per follower when, in their opinion, special circumstances demand this concession ; but before doing so, they should be careful to ascertain that the necessary extra transport is available (Government of India letter, Military Department, No. 3554-D, dated Simla, 1st August 1893)."

Page 232.—Expunge the third and fourth lines from the bottom and substitute—

" If possible, bhúsa issued to camels should be ¾ white and ¼ missa bhúsa.

To facilitate reference, please insert the following page headings, which were not noted in the proofs :—

Pages 2 to 5 ..... "Introductory."
Pages 7 to 9 ..... "Books of Reference."
Page 11 ..... "Orderly Duties of Transport Classes."
Pages 12 to 24 ..... "Hindustani Vocabulary."
Pages 55, 56 ..... "Ageing Mules, Ponies and Donkeys."
Pages 57, 58 ..... "Ageing Bullocks."
Pages 60 to 66 ..... "Detection of Unsoundness."
Page 67 ..... "Unsoundness in the Bullock."
Pages 82 to 84 ..... "Signs of Health and Sickness in Animals."
Pages 85 to 89 ..... "Veterinary Appliances."
Pages 90 to 96..... "Veterinary Medicines."

LECTURE I.

INTRODUCTORY.

Object of establishing Transport Training Classes.

THERE are no doubt many among you who do not quite understand what you have come here to learn. I will tell you the gist of the matter in a few words and will afterwards go into details. You have come here to learn to keep transport animals of all descriptions in good working condition and health, and their saddlery and gear in a state of efficiency, also how to adjust various loads of military baggage and stores.

Object of Transport Training Classes.

I must tell you that for the last ten years we have kept up in India a permanent Transport branch of the Commissariat Department. Besides teaching departmental officers and subordinates, instruction has been given to regimental officers and men.

Some of you will have seen in the newspapers that we have now 18,000 transport mules in India as opposed to a very insignificant number kept up ten years ago.

Now, although we do not want to publish our shortcomings to the world, I think I may inform you, as aspirants to transport knowledge, that in our late expeditions on the Indian frontiers the number of transport animals incapacitated from work through galls and sickness has become very large and this among well-seasoned and regularly-worked animals.

The deduction to be made from this is that, unless we try hard to perfect ourselves in the management of transport animals, both pack and draught, we shall break down on service, and the first time we engage in a big war we shall find, after a couple of months, that our 18,000 mules have dwindled down to 10,000, with a balance of galled and unfit animals crowding our transport veterinary hospitals.

In the event of such a war, we should not only use our 18,000 mules, but we should have to buy at least another 25,000 transport animals and get drivers for them as best we could.

If our seasoned mules handled by trained drivers knock up in short campaigns, I ask you what would be the fate of the 25,000 newly-bought animals in the absence of a sufficient number of intelligent and well-trained supervisors?

It is only a little more than a year ago that the Quartermaster-General in India addressed G.Os.C. in the following terms :—

" Recent reports on field operations received from G.Os.C. bring to notice a " general want of knowledge displayed by the troops in " transport loading and the management of animals, and " lead the Commander-in-Chief to believe that sufficient " attention is not paid to regimental instruction in this " important part of a soldier's duty.

Quartermaster-General's letter regarding the importance of transport training.

"2. His Excellency considers deficient practice in this particular branch of "military training a most serious matter, and one which would cripple the "efficiency and mobility of an army in the field, and desires therefore that "General Officers will give their earnest attention to the question in view to "the provisions of paras. 2, 3, 6, and 8 of G.O. 46 of 1890 being strictly carried "out.

"By order,
"JAMES BROWN, M. G.,
"Quartermaster-General in India."

Does not this all point to the necessity for all who are now, or may be in future, concerned in the management of transport animals to embrace every opportunity of making themselves efficient in this branch of their military duties ? When speaking of a new pack saddle lately invented, the *Pioneer* says (April 9th, 1892) with reference to transport generally :

Extract from an article in *Pioneer* about Indian Transport.

"As regards transport in the Commissariat Department, in Continental "armies, in Europe especially, this branch has become so "identical with railways that the details it has to con- "sider are much simplified. In India, however, the "difficulties our ancestors had to contend with still continue. The mightiest "belt of mountains in the world fences in its land frontiers, and a "modern army has to meet these obstacles in its path with appliances "not differing so greatly from those that Hannibal had at his command "in crossing the Alps. All our recent small wars in the East have had, "and in all probability our future great wars will have, a mountainous country "for their battle-fields, with few or no railways to convey troops and supplies. "India being thus exceptional in its inability to avail itself of nineteenth "century discoveries for means of transport during a war beyond its frontier, "it is not strange that it should be in India itself that ideas for the improve- "ments on the primitive methods of carriage over mountains should be suggest- "ed, and there are indications that such ideas are beginning to take a practical "form. It is not too soon. Those who can remember the great waste (perhaps "then partly unavoidable under the circumstances) that took place during the "last Afghan war—notably waste of animal life, when the camel bid fair to "become a rare quadruped in the North-West,—will see the importance of any- "thing that tends to protect the hardy mule which will take its place in the "next campaign in that part of the world.

"The Indian Commissariat, as is well known, has long been preparing itself "for all possible contingencies, but it has always been felt that its most serious "stumbling block in seeking perfection has been the transport. Although "probably the transport would be able to meet the large demands for carriage "at the outset, who that has had any experience of that department would "venture to say that, after a month or two, the majority of the mules collected "would not be incapacitated from efficient service by sore backs ? It has been "well known that this fact has been troubling the minds of some of the best "officers of that branch of the service."

On service the soldier must be fed and supplied with ammunition.

A certain amount of baggage must be carried for him, and he must be provided with shelter when exposed to extremes of climate. The cavalry and artillery also want forage and clothing for their horses. You will all acknowledge that the work of transporting these necessaries of life over mountain ranges, across sandy and waterless plains, and through broad river-beds is accompanied by considerable hardship and difficulty; and who bears the greater part of this hardship? The transport animal and his driver, and therefore it is to your own interest to care for them and do your best to keep them in health so that they will have strength to carry for you and your comrades the necessaries on which your efficiency, and even your lives, may depend.

Regimental transport.

In the field each regiment of an Indian army has charge of its own carriage, and it is therefore necessary that every soldier should at least know how to load a mule or a camel in such a way that it can do its march in comfort and will not have to undergo the suffering which bad loading always occasions.

Now the difficulty of keeping our Transport thoroughly efficient is by no means insuperable.

It is simply a question of common sense and diligence and the acquisition of a little knowledge to which you can all easily attain if you have the education and intelligence which the regulations enjoin should be possessed by men attending transport training classes.

Passing from the public questions of efficiency and necessity, I will now speak of regimental transport with reference to *esprit de corps* and personal convenience.

On service, any regiment which, in addition to general efficiency and fighting qualities, has a name for good loading and care of its transport, is always sought after, and is generally selected, where exceptional work has to be done.

No General will, if he can help it, be bothered with a regiment who cannot manage their transport well and who have, at the end of a march, to sit for hours in the sun waiting for their tents and kits, while other regiments are comfortably sheltered and enjoying the rest which will make them fit for the next day's work, whatever it may be.

Thus it is easy to see that a regiment which takes care of its transport will, provided it is fit in other respects, enjoy exceptional opportunities of seeing fighting and gaining distinction. Besides the transport in charge of regiments, a large proportion will always be required on field service for ordnance and commissariat purposes. To assist in the supervision of this transport, regiments will be drawn upon for officers and non-commissioned officers, and here again those who pay attention and qualify themselves thoroughly, will have an opportunity of seeing service and performing useful duties for which they will be well paid.

Transport for ordnance and commissariat purposes in the field.

I would also mention that of late years rewards have been liberally distri-

buted to those who have distinguished themselves when performing transport duties in the field.

Summary of subjects to be studied.

The following is a short summary of what you will be taught during the class :—

Instruction on the different animals used for military transport in India.

Their make and shape.

Breeds and peculiarities.

Carrying and draught powers.

Sources of supply.

How to age them and detect ordinary unsoundnesses to which they are liable.

General stable management and conditioning of remounts including scales of feed.

How to measure and describe animals in rolls so that they will be subsequently recognised.

Scales of attendants. Attestation and discipline. Pay, clothing (peace time and on field service).

Practical branding.

Branding remounts.

Distinguishing healthy from sick animals.

Treatment of simple diseases of different animals.

Galls and wounds and their treatment.

Different kinds of bandages and their uses.

Use of thermometer.

Illustrated lecture on the equipments of different kinds of transport animals.

Details of gear.

Sources of supply.

Marking gear.

Care of saddlery and gear.

Stuffing and fitting saddles and equipments.

Breaking ponies and mules to draught and restraining restive animals.

Illustrated lecture on principles of packing and loading.

Packing and loading various military loads on different descriptions of animals.

Lecture on repair of gear and repairing materials (very important).

Duties of various artificers, their tools and materials for work.

Common errors in workmanship to be avoided.

Instruction in shoeing mules and bullocks (theoretical, and also practically illustrated by shoeing-smiths).

Casting rules.

Routine and discipline on the march.

Order of march.

Shipping and entraining different transport animals, care of animals and disposal of gear on boardship and on railway journeys.

Lecture on followers' books, muster rolls and records kept up by regiments and depôts.

Lecture on field service procedure and the use of field service forms.

There will be an examination in practical and theoretical work at the end of the first three weeks. Fair notes will then be looked over and marked and will be again examined at the end of the course. These fair notes will assist the instructor in assessing individual intelligence and capacity for absorbing information, and will enable the examiner to gauge the attention which has been paid to the subject, more particularly in the case of those who come from Infantry Regiments and have had no previous instruction in the care and management of animals.

The subjects for the final examination will be found in Appendix 55, Vol. V, Army Regulations of India, but it may be mentioned that the reconstruction of this Appendix is at present under consideration.

LECTURE II.

Transport Regulations.

STANDARD BOOKS OF REFERENCE.

YOU will see from the curriculum described in the opening lecture that you have a good deal to learn in the short time at our disposal, and, as you progress in your work, you will realise that, without a fairly sound knowledge of the details enumerated, you would be placed in a false position in the event of valuable Government animals being entrusted to your care.

There are a number of useful standard works in print which can be read in connection with the question of Transport training, and the following selections from these books will be useful to read and bear more or less directly on regimental Transport duties. You will thus be able in your leisure hours to extend your Transport knowledge and amplify in your own minds the lectures which will be delivered to you.

Standard works to be read.

As regards the theoretical portion of the work, it must be understood that in the short time at our disposal, an instructor and lecturer can do little more than put you in the way of mastering the subject and much depends on private study.

The first book to be brought to notice is Volume V, A. R. I. (Commissariat Transport). It contains the regulations for the work of the combined department in peace-time, and Regimental Transport Officers and Assistants should be acquainted with the following selected portions of the book :—

Selections from Vol. V, A. R. I.

Section I, Paras. 1 *to* 96.—These state the terms under which Officers, Warrant Officers, and Non-Commissioned Officers of the permanent establishment join and serve in the department. All Transport Officers should have a fair idea of these paragraphs, as they may at any time be called on to take charge of a Transport Depôt. For the same reason, if time permits, you should read through the remainder of Section I, as it refers principally to the regulations under which the clerks and agents of the permanent establishment serve in the department.

Section IV, Para. 720.—Regulations regarding samples including grain.

„ *Para.* 732.—Rules regarding weights and measures.

Section VII, Paras. 1131 *to* 1136.—Rules regarding scales and weights. It is important that every officer in charge of Transport should be well acquainted with these paragraphs.

Section VIII.—This section deals with the question of supply by contract. Officers in charge of Regimental Transport who receive grain, forage, and petty

supplies direct from the Commissariat should make themselves acquainted with the terms of all contracts for the supply of these articles, and they will thus be able to judge whether the suppliers are acting up to the terms of their contracts.

Section IX, Commissariat Accounts.—These regulations will not directly affect Regimental Transport Officers, but if you have time to read this section, it will give you a good idea as to how funds are provided for the various expenditure connected with Transport animals, their feed and gear, the rules under which such funds are disbursed and accounted for, and the auditing of the accounts rendered.

Section XII.—As a Transport Officer or Assistant you should be well acquainted with the contents of this section and more particularly with the paragraphs bearing directly on Regimental Transport.

Before reading this section, however, you should ascertain whether the book is corrected up to date.

Of the Appendices, you should study the following carefully:—Nos. 38 to 43; Nos. 45 to 51.

Vol. 10, Part 2, A.R.I.

Volume 10, *Part* 2, will only be necessary in so far as it contains the authorized scales of carriage allowed for troops when moving on relief by route march in India. These rules are laid down in Section I, Sub-section III, paras. 88 to 151.

Commissariat Transport Field Service Code.

Commissariat Transport Field Service Code.—The present Code published in 1891 is only provisional, and it is anticipated that another and more complete edition will shortly be published. It is, however, necessary that you should make yourselves acquainted with the following selections from the present Code, and in any future issue, by glancing down the table of contents, you will at once see what sections and sub-sections will affect you as Transport Officers and Assistants. On service you may be employed either with Regimental or General Transport, and you should therefore know the regulations affecting both these branches.

Section II.—Read *Sub-sections* 3, 4, 5, *and* 7. These paragraphs deal fully with the rules concerning superior and inferior establishments.

Section III.—Read *Sub-sections* 3, 4, **5**, *and* 6. These are important and should be understood by every Transport Officer or Transport Assistant.

Section IV.—Read *Sub-sections* 9, 10, *and* 11.

Section V.—Read the whole of this section. It gives a good idea of the different descriptions and weights of Commissariat Stores which have to be carried. It also lays down the marks by which the stores of different departments will be recognised.

Section VI.—Read *Sub-section I* as far as it refers to Transport Drivers and Ambulance Bearers; also *Sub-section* 6.

Section VIII.—The whole of this section should command serious attention, and should be read, not as it would affect a Commissary-General in Commissariat Transport charge of an Army Corps, but as it would concern Regimental or Brigade Transport Officers or Transport Sergeants and Assistants. You are not, of course, asked to attempt to commit to memory the various tables of

Transport resources herein detailed, but at the same time it will be useful to know that such records do exist and where they can be found. Note very carefully *Sub-sections* 4 *to* 14.

Section XI.—Read carefully *Sub-section* 5. It deals with the accounts and returns which Transport Officers have to render in the field.

Sub-section 6 deals with the manner in which hired transport is accounted for and paid.

Sub-section 7 gives the general rules for accounting for stores and cash.

Sub-section 8 deals with the payment of followers, and *Sub-section* 9, which gives some miscellaneous information, should also be noted.

Of the Appendices, the latter part of *No.* 12 gives the field service pay and batta of Transport establishments.

Appendix 40 details the tools allowed on field service for Transport artificers.

Appendix 44 details the different printed forms which are used on field service.

Field Service Forms.

The following forms will affect Transport Officers :—Nos. 1, 2, 6, 7, 8, 14, 15, 16, 17, 20, 21, 22, 35, 36, 37, 38, 39, 40, and 41 and Cantonment Form, Commissariat Transport, No. 18.

Forms of Pay Bill.

Forms of Pay Bill are also required on service, namely, Military Accounts Forms 122, 127, and 128.

Field Service Equipment Tables.

Field Service Equipment Tables deal with the baggage allowed to different arms of the service in the field. There have been several issues of these tables, and the present issue of 1891 is only provisional. The Commissariat Field Service Code and Forms and the Field Service Equipment Tables will be the subject of a future lecture.

In reading these books it must be remembered that Transport is a progressive science and that regulations on the subjects of establishments and equipments of Transport followers and animals have no finality.

You should therefore always be careful to find out whether the copies of the regulations which you are reading contain the latest alterations and modifications.

Burn's Notes on Transport and Camel Corps.

Notes on Transport and Camel Corps, 1887, by Major D. B. Burn, 18th Hussars.—This is a very useful book and has been distributed to all Commissariat-Transport Offices. The book deals exhaustively with the various Transport animals in use, and the greater part of the book applies to animals in India. The Author's Transport experience would seem to have been principally confined to Egypt and the Soudan. The scales of gear, rations, &c., which he quotes as being allowed in India are for the most part out of date ; but the general information and principles inculcated are excellent. Attention is drawn to the sketch opposite page 277, showing the working of Transport on lines of communication.

Steel on the Camel.

"*A Manual on the Diseases of the Camel and of his Management and Uses*," by John H. Steel, V.S.—The late author of this book was the Principal of the Bombay Veterinary College.

The following chapters are well within the scope of the information necessary for a Transport Officer, and should be read :—Chapters 1, 2, 5, 7, 8, 11, and 12 and Appendices 3, 4, and 5.

Packing and Loading, by Hayter and Kelly.

"*Transport Packing and Loading applicable to Field Service,*" by Hayter and Kelly.—This is a very useful and practical book, which was published in 1883. Owing to changes in equipment and regulations, this book has become to some extent obsolete, and this will be explained when we proceed to the work of packing and loading.

Harvey Riley on the Mule.

"*Harvey Riley on the Mule.*"—This is a complete work on the mule written in a cheery style. It contains many details of mule carriage used in the North and South War in America, and the author is thoroughly practical in all he writes. This is a book which you should all read.

Sanderson's Pack Gear for Elephants.

"*Sanderson's Pack Gear for Elephants,*" deals with the improved equipment used for these animals.

Ryland's Army Transport.

"*Army Transport in Peace and War, India,*" by Captain H. G. Ryland.—This book contains much useful information and is up to date. The great objection to it is its prohibitive price, namely, Rs. 3-8-0, which practically places it beyond the reach of non-commissioned officers and soldiers. The price of a Transport Manual for the use of all ranks should certainly not exceed one rupee eight annas.

Wickham's Manual on Transport Training.

"*A Manual on Transport Training Classes and Regimental Transport,*" by Captain Wickham, A.C.G., Price 8 annas.—This being my own production, I will leave you to judge of its merits and defects. In writing it, my aim was to place some information on Transport matters within the reach of every soldier. It was written four years ago and part of it is out of date, but corrected copies are kept up. The Hindustani translations in the Urdu and Hindi characters are procurable at the same price.

Fitzwygram on Horses and Stables.

"*Horses and Stables,*" by Lieutenant-General Sir F. Fitzwygram.—To those who would like to possess a very complete book applicable to the management of horses, ponies, and mules, the third edition of this book is recommended. The second edition cost about ten rupees a copy, but General Fitzwygram now foregoes all profit on the sale, and the third edition can be bought at Combridge's in Bombay at Rs. 3-6-0 per copy, a very cheap price for such a highly-finished and well-illustrated book.

LECTURE III.

Orderly Duties of Training Class and Glossary of Hindustani Words.

It will be readily understood that the instruction of a Transport class adds considerably to the ordinary work and absorbs a good deal of the time and attention of the Transport Officer and his Assistants, which is so necessary for the satisfactory working of a Transport Depôt. An examination of the Register of Indents in a large station will show that a good deal of work has to be got through. A Transport Officer's aim, therefore, should be to initiate his pupils as soon as possible into the general system of work, so that they will become a help and not a hindrance to him.

With this object in view, orderlies should be detailed weekly to assist in the supervision of work, and, after the first few lectures, each Officer will have a certain number of animals and their gear placed in his charge with Native Officers and Non-Commissioned Officers to assist him. They will thus be enabled to practically apply their newly-acquired information before it has faded from their memory and correct all mistakes which come to their notice, for they will find that the Transport driver is by no means immaculate, although he does hard work for small pay.

Duties of Orderlies of Transport Training Class.

The orderlies detailed should be as follows. Their numbers should be fixed, so that every one will have at least one tour of duty during the class.

They come on duty every Monday morning.

British Officer of the week.

Native Officer ,, ,,

British and Native Non-Commissioned Officers of the week.

Their duties should be as follows. The hours laid down are for a fairly cool climate and are, of course, subject to alteration in extremes of heat or cold.

DUTIES OF THE BRITISH OFFICER OF THE WEEK.

Duties of the British Officer of the week.

1. He should come on duty on Monday morning.

2. He should attend morning stables daily at 6-30 A.M. (winter months, 7-15 A.M. See Lecture IX.)

3. He will see feeds laid out during stables and satisfy himself that the proper amount of grain is issued.

4. Water at 7-30. Feed at 8 A.M. (Winter months, ¾ of an hour later.)

5. He will attend evening stables 4 P.M. to 4-45 P.M. twice a week. Water at 5 P.M. Feed at 5-30 P.M.

6. He will visit the lines and sick stables twice by night after 10 P.M., when he will see that the sentries are alert and the mules and bullocks securely picketed and properly *jhooled.*

7. He will visit the workshops daily during working hours and will inspect and initial the workshop books daily.

8. He will daily inspect the muster rolls of the depôt and the working state of the previous day. He will also see that the requisition book is correctly kept up.

9. During his tour of duty he will make himself acquainted with the different records kept up in the office for drivers, &c.

10. He will visit the drivers' lines twice a week and satisfy himself that the lines are kept clean.

11. He should report in writing to the Transport Officer at the end of his tour of duty that he has performed all the duties laid down for him and should bring to notice any suggestions or improvements which may occur to him.

DUTIES OF THE ORDERLY NATIVE OFFICER.

Duties of the Native Officer.

1. The Native Officer of the week will assist the British Orderly Officer and the Warrant Officer in charge of the lines as may be required.

2. He will attend morning and evening stables daily and visit the mule lines and sick stables three times by night during his tour of duty.

3. He must make himself acquainted with the system of work in the lines and, as far as possible, with the books kept up.

DUTIES OF THE BRITISH AND NATIVE ORDERLY NON-COMMISSIONED OFFICERS (TRAINING CLASS).

Duties of British and Native Orderly N.C.Os.

1. They will attend all stable hours and watering parades ; also see forage weighed during morning stables as directed by the Native Orderly Officer.

2. They will also assist the Warrant Officer in charge of the lines as required and will make themselves acquainted with the system of work in the lines and all books used in the office.

Hindustani vocabulary of words commonly used in Transport work

The following English and Hindustani vocabulary will be found useful when carrying out the above duties and when giving orders to natives. The words have been grouped under convenient headings. For instance, under the heading "Stables" will be found the names of articles in general use in the Mule and Bullock Lines, and under "Repairs" the necessary artificers' tools and materials.

As regards pronunciation, a fairly correct rendering of the Hindustani words can be given by observing the following simple rules :—

Pronunciation of Hindustani words.

a is pronounced like *u* in *but*, except when it is a final letter, when it is sounded like the final "a" in America.

á is pronounced like *a* in *barn*.

e ,, ,, *a* in *spade, day*.

i ,, ,, *i* in *bit*.

í ,, ,, *ee* in *beetle*.

o ,, ,, *o* in *bone*.

ú ,, ,, *oo* in boot.

ṅ is almost silent.

g is pronounced hard like g in *gun*.

Adverbs, Participles, etc.—

All, every ... ... sab.
And ... ... aur.
Another ... ... dúsra.
Back (hind, backwards) ... ... píchlé.
But ... ... lekin, magar.
Below, down ... ... níché.
Enough ... ... bas.
Front, before ... ... ághe.
From ... ... se.
Half ... ... ádhá.
In ... ... meṅ.
Inside ... ... andar.
If ... ... agar.
Much, very ... ... bahut.
No ... ... nahíṅ.
Negative order ... ... mat (bolo mat, be silent).
Now ... ... ábhí.
One quarter ... ... ek páo.
Slowly ... ... áhista.
To ... ... ko.
Quickly ... ... jaldi.
Up, over ... ... úpar.
What ... ... kía.
Right (to the right hand) ... ... dáhiná hath ; sídha háth (Bombay).
Left (to the left hand) ... ... báín hath ; dáwé hath (Bombay).
Straight on ... ... ágé ; sídha (Bombay).

Adjectives generally used in connection with Transport work—

Big ... ... bara.
Black ... ... kalá.
Clean ... ... sáf (make clean, sáf karná.)
Cold ... ... thanda.
Crooked ... ... bánka, tera.

Adjectives—continued.

Dirty ... ma,ila.
Dry ... súkha.
Equal, even ... barábar.
Fat ... mota.
Good, well ... achcha.
Grey ... sabza.
Green ... hará.
Heavy ... bhárí.
High ... úncha.
Hot ... garm.
Lame ... langrá.
Lazy ... súst.
Light ... halká.
Long ... lambá.
Red ... lál.
Old ... purána.
Short ... chota.
Sick ... bímár.
Slack, loose ... díla.
Soft, fine ... narm.
Straight ... sídha.
Thin ... patla, dúbla.
Tight ... tang.
White ... safed.
Wet ... gíla.
Yellow, dun ... píla.
Young ... jawán.

Animals, names of—

Buffalo ... bhá,ins.
Bullock ... báil.
Camel ... únt.
Cow ... gáe.
Donkey ... gadhá.
Elephant ... háthí.
Mule ... khachcha.
Pony ... tattu, yabú

Artificers (see Establishment and Repairs).

Barley (see Forage).

Blacksmith (see Establishment and Repairs).

Bran (see Forage).

Breed ... zát.

Body, parts of—

Back ... pít.
Belly ... pet.
Body ... badan.
Bone ... haddí.
Carcase ... lásh.
Croup ... chútar.
Ear ... káṅ.
Entrails ... antari.
Eye ... ánkh.
Fat (noun) ... charbí.
Fetlock ... mútha, gámchí.
Flesh, muscle ... gosht.
Foot ... páṅw.
„ hind ... píchlé páṅw.
„ fore ... áglé páṅw.
Hair ... bál.
Head ... sír.
Hock ... khonch.
Hoof ... súm.
Horn ... síng.
Jaw ... jabra.
Knee ... gútna.
Liver ... kalíja
Loin ... kamar.
Lung ... pephri, pepsa.
Mouth ... múnh.
Neck ... gardan.
Nose ... nák.
Shoulder ... kándha.
Sinew ... nas.
Skin ... chamra.
Throat ... gala.
Tongue ... jíbh.
Tooth (incisor) ... dáṅt.
„ (molar) ... dár.

Carpenter (see Establishment and Repairs).

Carrots (see Sick Stables).

Cart ... gárrí.
Axle ... dhúra.
Curricle bar ... júa.
Felloe ... púthi.
Nave ... túm.
Pole ... chob.
Spoke ... ára.

Cart—continued.

Throat-lash for Bullocks ... ... jotar, jatrás.
Tyre ... ... hál, patá.
Wheel ... ... chák.
Yoke ... ... júa.
Yoke-pin ... ... arlí.

Clothing for Drivers and Bearers—

Belt ... ... peti ; patta (Bombay).
Buckle ... ... baksoa.
Button (thread or leather) ... ... gúndí.
„ (horn or metal) ... ... batan.
Chevron, stripe ... ... billa ; fít (Bombay).
Cloth, woollen ... ... banát.
„ cotton ... ... kapra, rúi-ka-kapra.
Haversack ... ... jola.
Leg bandages ... ... patti.
Loin cloth ... ... dhótí.
Medal ... ... taghma ; billa (Bombay).
Pair ... ... jora.
Shirt ... ... kúrta, paíran.
Shoe ... ... jútá.
Shoes, pair of ... ... júti.
Trousers (native pattern) ... ... pá,e-jáma.
Turban ... ... pagri.
Uniform ... ... wardì.
Water-tin for Drivers ... ... ketlí(corruption of kettle).

Disease (see Sick Lines).

Driver (see Establishment).

Equipment—

Bullock Equipment—

Eye fringe ... ... makhirna.
Feeding cloth ... ... jola.
Head rope ... ... agári.
Mallet (wooden) ... ... máltí.
Nose rope ... ... náthí.
Reins ... ... rás, bág.

Camel Equipment—

Crupper rope ... ... dúmchí.
Girth rope ... ... tang.
Headstall ... ... núkhta.
Leading rope ... ... bágdúr.
Loading net ... ... ládne-ka-jhál.
Loading rope ... ... ládne-kí-rassí.
Nose rope ... ... nakel.
Saddle (camel) ... ... palán.

Equipment—continued.

Donkey Equipment—

Picketing rope	lá,indorí.
Saddle	súndka.
,, cloth	namda.

Elephant Equipment—

Bag for carrying grain ration	dánakhorí.
Basin, iron	gamá,ila.
Chain, hindfoot	langar.
Crupper rope	dúmchí.
Crupper pipe	dúmchí-ka-nal.
Girth	tang.
Goad, iron, for driving	ákrí.
Hide, leather, for kneading flour	charsa.
Loading rope	ládne-kí-rassi.
Neck rope...	gorband.
Numdah	gadéla.
Pad for saddle	gaddí.
Plate iron for cooking flour ration	táwah.
Rug for clothing	jhúl.
Saddle, iron	zín.
Shackle chain for forefeet	berí.
Wrapper for holding and supporting loads ...	salíta.

Mule or Pony Equipment—

Bit	lagám.
Breastpiece	sínabund, gorband.
Breeching	pícharband.
Chain	janjír, sankalí.
Chain for forefeet	áglé paṅw-ka-janjír.
Chain for heel	píchlé paṅw-ka-janjír.
Connecting rod	júa.
Crupper	dúmchi.
Feeding bag	tobra.
Forage net	jhál.
Girth	tang.
Head collar	núkhta.
Loading rope	lád-ki-rassi.
Rein	rás, bág.
Rug for clothing...	jhúl.
Saddle	zín, khátí.
,, pad	gaddi, khogír.
Strap	tasma.
Sickle	darántí.

Equipment—continued.

Mule or Pony Equipment—continued.

Tarpaulin ... ... tarpál, tarputri (corruptions of tarpaulin).

Throat lash ... ... galaband.

Trace ... ... joth.

Water bags, carried by animals... ... ... pakhál.

Water bag, hand ... ... mashak.

Establishments, Names of—

Agent... ... ... gamáshta.

Blacksmith ... ... lohár.

Carpenter ... ... mestri; baráhi; sutar (Bo:)

Camel-driver ... ... sárwán.

Elephant-driver ... ... mahút.

Petty Officer in charge of 25 animals ... ... daffadár.

„ „ „ 50 „ ... ... jamadár.

Saddler ... ... mochí.

Shoeing-smith ... ... nálband.

Forage and Grain—

Barley ... ... jáo.

„ parched and ground... ... ... ardáwa.

Bran ... ... chokar; bhúsa (Bombay).

Flour ... ... átta.

Fodder ... ... chára.

Gram ... ... channa.

„ parched and ground ... ... sattu.

Grass, dry ... ... ghás.

„ green ... ... hará ghás.

Green wheat or barley ... ... kasíl.

Indian corn ... ... makka.

Oats ... ... jái.

Stalks of—

Jowari ... ... karbí.

Bajri ... ... charrí.

Indian corn ... ... makkaí.

Straw, bruised and broken ... ... bhúsá.

Sugarcane ... ... ganná.

Ration of grain ... ... dána.

„ fodder ... ... chára.

Rice, unhusked ... ... dhán.

Wheat ... ... gíhún.

Grain (see Forage).

Gram (see Forage).

Grass (see Forage).

Loading (also see Adverbs, Equipments, Verbs, &c).

Bag ... ... borí ; thailí (Bombay).
Baggage ... ... asbáb ; sâman (Bombay).
Cooking pot ... ... degchi, hándí.
Box ... ... sanduk ; peti (Bombay.)
Tent ... ... dera; shaldári; tambú (Bo.)
Tent pole ... ... chob.
„ wall ... ... kanát.

Medicine (see Sick Lines).

Numbers.

1	...	... ek	16	...	... sola
2	...	... do	17	...	... satra
3	...	... tín	18	...	... athára
4	...	... chár	19	...	... unís
5	...	... pánch	20	...	... bís
6	...	... chha	30	...	... tís
7	..	... sát	40	...	... chálís
8	...	... áth	50	...	... pachás
9	...	... náu	60	...	... sát
10	...	... das	70	...	... sattar
11	...	... igára	80	...	... assí
12	...	... bára	90	...	... náuwe
13	...	... tera	100	...	... sàu
14	...	... chauda	1,000	...	... hazàr
15	...	... pandra	First	...	... pailha
			Last	...	... ákhiri

Office ... ... daftar, afíz (corruption of office).
Book ... ... kitáb.
Envelope ... ... lafáfa.
Gum ... ... gond.
Ink ... ... sháyí.
Paper ... ... kághaz.
Pen ... ... kalam.
Pencil ... ... pencíl.

Pronouns—

I, we ... ... máin, ham.
You ... ... túm.
He, She, It, That ... ... wuh.
This ... ... yíh.
Mine ... ... méra, hamára

Pronouns—continued.

Yours ... ... túmhâra.
To me ... ... mujh-ko, ham-ko.
To you ... ... túmko.
To him, her, it, that ... ... úsko

Rations (see Forage).

Repairs, materials for.
„ artificers and tools for.

Blacksmith ... ... lohár.
Anvil ... ... gáṅh, sindán.
Bellows ... ... dáṅkní.
Bolt ... ... kábla.
Charcoal ... ... ko,ela.
Coal ... ... kolsa.
File ... ... réti, kánús.
Hammer, sledge ... ... mártol.
„ hand ... ... hathorí.
Iron ... ... loha.
„ cast ... ... bír-ka-loha.
„ wrought, Swedish ... ... míta-loha.
„ „ common ... ... khára-loha.
Nut ... ... debrí.
Punch ... ... súmba, golsum.
Ring ... ... karí.
Rivet ... ... jarna.
Steel ... ... foulád, ispát.
Tongs ... ... chimta, sánsí.
Vice ... ... zambúr.
Washer (iron) ... ... loha-ki-chaki.

Carpenter ... ... baráhi ; sútár (Bombay).
Adze ... ... basúla.
Chisel ... ... cháinhi ; tankí (Bombay).
Gimlet ... ... barma.
Hammer ... ... hathori.
Nail ... ... kíla, mekh.
Spanner ... ... chabi, pána (Bombay corruption of spanner).
Pincers ... ... sánsí.
Rule (2 feet) ... ... fút. do futta (corruption of foot rule).
Saw ... ... árí ; karwat (Bombay.)

Repairs—continued.

Carpenter—continued.

Screw ... ... pench.
Screw-driver ... ... pench-kas.
Tack ... ... berinji, takus (Bombay).
Wood ... ... lakri.
„ acacia ... ... babúl.
„ Andaman ... ... pedook.
„ black ... ... shíshham.
„ teak ... ... ságwán.
Saddler ... ... mochí.
Awl ... ... árí.
Blanket ... ... kamal.
Buckle ... ... baksoa.
Cloth, goat's hair... ... ... chat.
„ made of coarse vegetable fibre ... ... tát.
Knife, saddler's ... ... rápí.
Leather, cow ... ... gae-ka-chamrá.
„ buffalo ... ... bháins-ka-chamra.
„ sheep ... ... bherí-ka-chamra.
Needle, packing ... ... súa súja.
„ sewing ... ... súi.
Pincers ... ... sánsí.
Punch ... ... golsum.
Serge ... ... lúí.
Stone for sharpening tools ... ... sán (Bombay).
Strap ... ... tasma.
Tar ... ... dámar.
„ Stockholm ... ... waláití dámar.
Thread flax ... ... dhága.
Twine ... ... sútlí.
Vice ... ... zambúr.
Wax ... ... mom.
Webbing ... ... newár.
Wool ... ... ún.
Shoeing Smith ... ... nálband.
Buffer ... ... baffa.
Horn (of foot) ... ... súm.
Frog of foot ... ... pútli.
Hole (in shoe for nails) ... ... ched.
Knife (farrier's) ... ... chúri.
Nail (for horse-shoe) ... ... mekh.
Rasp ... ... kánus.
Shoe (horse or mule) ... ... nál.

Shoeing (see Artificers, Repairs).

Sick Lines, appliances for.
„ diseases.
„ medicines.

Abscess ... ... phúra.
Aloes ... ... musábar.
Alum ... ... phitkari.
Anthrax ... ...
Assafœtida ... ... hing.
Ball of medicine ... ... golí.
Bandage ... ... patti.
„ woollen ... ... garm patti.
„ cotton ... ... thanda patti.
Blister ... ... palaster (corruption of blister).
Blood ... ... lohú, khún.
Blow ... ... már.
Boil ... ... phúnsí.
Boiler ... ... degchi.
Brand, mark ... ... dág, nishán.
Breath } Breathing } ... ... dam.
Camphor ... ... káfúr.
Catechu ... ... katha.
Chalk ... ... karu.
Carrots ... ... gájar.
Cold or catarrh ... ... sardi.
Colic ... ... kúkrí; kulinj; pet-ka-dard.
Cough ... ... kháńsi.
Cotton wool ... ... rúí.
Diarrhœa ... ... dast.
Disease ... ... bímári.
Enema ... ... pichkári.
Farcy ... ... ajambhau.
Fever ... ... táp, bokhár.
Fomentation ... ... seńkhni.
Fomenting pad ... ... senkhní-ka-númda.
Forceps ... ... sánsí, chimta.
Ginger ... ... sonth.
„ green... ... ... adrak.
Glanders ... . ajambhau.
Inflammation ... ... jalán, garmi.
Itch, mange ... ... kúdgli.
Knife... ... ... chúri.
Lamp, lantern ... ... fánús, chirágh.
Liniment ... ... roghan, malish-ka-tel.

Sick Lines—continued.

Mange	kúdgli,kárish.
Matter, pus	píp.
Medicine	dáwa.
Mucous membrane	jhillí.
Mustard	ráí.
Needle	súí.
Nitre	shora.
Oil	tel.
„ linseed	alsi-ka-tel.
„ mustard	rai-ka-tel.
„ sweet	míta-tel.
Opium	afím.
Ointment	marham, lep.
Pepper, black	kála-mirrich.
„ red	lál-mirrich.
Probe	salai.
Pulse	nabz.
Scab	paprí.
Scale of skin	kaflí.
Scurf	bhúsa.
Sickness	bimári.
Soap	sábún.
Sugar, coarse	jágri.
Sulphate of iron	hera-kassí.
„ copper	níla-tota.
„ magnesium (epsom salts)	ìpsam-ka-nimak (corruption of English).
„ zinc	safed tota.
Scissors	kainchi.
Sulphur	gandak.
Sprain	moch.
Swelling	súj.
Temperature	mizáj,Halat-i-garmi-o-sardì
Thermometer	pára-ki-shishi.
Tow	san.
Tooth rasp	dár-ka-kánus.
Towel	jháran ; towál.
Tumour	phúnsì rá súli.
Treacle	shíra.
Turpentine	tárpen ; tárpentel (corruption of turpentine).
Water	páni.
Wound	zákhm.
Worms	kíra.

Stables, articles in use in, etc.—

Age ... ... úmar.
Basket ... ... tókrí.
Bedding for animals ... ... bicháli ; bichána (Bo :)
Broom ... ... jharú.
Brush ... ... brús (corruption of brush).
Bucket, canvas ... ... dhol.
„ leather ... ... dholchi.
„ metal ... ... bálti.
Currycomb ... ... karára.
Dubbing ... ... rogan.
Dung ... ... líd.
Female ... ... mádi.
Gravel, sand ... ... réti.
Hammer, iron ... ... mártol.
Hoof-picker ... ... kúrní.
Labour, work ... ... kám, mehnut.
Male ... ... nar.
Noise ... ... shor.
Peg ... ... mekh.
Pick-axe ... ... gainti.
Place ... ... jágah.
Rain ... ... barsát.
Rope ... ... rassi.
Rope for marking lines ... ... láindhori.
Salt ... ... nimak.
Scales ... ... tarázu.
Scissors ... ... kainchí.
Shovel ... ... belchá, pháura.
Side ... ... taraf; ek taráf, on one side; bázu (Bombay).
Soap ... ... sában.
Stick ... ... lakhri.
Stone ... ... pathar.
Standing for animals ... ... thán.
Urine ... ... pesháb ; múth (Bombay).
Water ... ... pání.
Year ... ... bars, sál.
Young animal ... ... bachcha.

Tools (see Repairs).

Verbs.	*Infinitive Mood.*	*Second Person Imperative Mood.*
To begin ...	... sharu kerna ...	... sharu karo.
To brand ...	... dag dena	... dag do.
To break ...	... torna	... toro.
To bring ...	... lána	... láo.
To clean ...	... sáf karna	... sáf karo.
To close, shut up	... band karna ...	... band karo.
To catch ...	... pakarna ...	... pakaro.
To come ...	... ána	... áo.
To cough ...	... khaṅsna	... khaṅso
To cut	... kátna	... káto.
To do	... karna	... karo.
To drink ...	... pína	... pí,o.
To dry	... súkhána	... súkháo.
To eat	... khána	... khá,o.
To fall	... girna	... giro.
To feed ...	... kilána	... kiláo.
To finish ...	... kaláss karna ...	... kaláss karo
To foment ...	... seṅkna	... seṅko.
To gall or rub ...	... ghisa lena ...	...
To get up ...	... utána	... úto.
To give	... dena	... do.
To go	... janá	... jáo.
To groom ...	... malish karna ...	... malish karo.
To hit (drive a peg)	... márna	... máro.
To let go ...	... chordena ...	... chordo.
To lift up ...	... ùtana	... útáo.
To light, set on fire	{ jelána ... ... / silgána (Bombay)	... jeláo. / ... silgáo.
To load	... ládna	... ládo.
To mend ...	... maramat karna	... maramat karo.
To mix ...	... milána	... miláo.
To open ...	... kolna	... kolo.
To place ...	... rakhna	... rakho.
To put on ...	... lagán	... lagá,o.
To rasp ...	... kánus márna ...	... kánus máro.
To run	... dáurna	... dáuro.
To say, speak ...	... bolna	... bolo.
To sew	... sína	... sí,o.
To soak	... bhigána	... bhigáo.
To spread out ...	... phailána	... phailáo.
To sprain ...	... moch karna ...	...
To stumble ...	... tokar márna ...	... tokar máro
To sleep ...	... sona	... so,o.
To sneeze ...	... chhínkna ...	... chhínko.
To swell ...	... súјna	...
To take	... lena	... lo.
To take off, out ...	... útárna	... útáro.
To throw down	... girána	... giráo.
To tie up, fasten	... bándhna	... bándho.
To tighten ...	... tang kerna ...	... tang karo.
To trip, stumble	... tokar khána ...	...
To water, give to drink..	pilána	... piláo.

Wounds (see Sick Lines).

LECTURE IV.

On the different Animals used for Military Transport in India. Their Uses, Make and Shape, etc.

[NOTE.—To illustrate lectures on make and shape, three animals of each description will be required. One should be a sound, well-bred, stout, compact, short-legged animal, and as regards mules, ponies, and donkeys, the other two should have, as far as possible, exaggerated defects, such as coarse, low-bred head, ewe neck, straight shoulders, long hollow back, slack loins, drooping quarters, flat sides, shallow girth, long crooked legs, cow hocks, and bad feet. Of the three camels, one should be compact, and the others should illustrate the various bad points of that animal as detailed in the lecture. If elephants are available, animals of different shapes should also be shown and their good points and defects pointed out.]

Animals used for Transport.

The following animals are used for military transport in India. We will begin with the largest and go down the scale according to size :—

Elephant.	Pony.
Camel.	Bullock.
Yaboo (big northern pony).	Donkey.
Mule.	

To all of these the rule applies that a compact, short-backed, short-legged, stout, strong-limbed animal is far superior, whether for pack or draught, to a leggy, long-backed, flat-sided weed. The one can do continuous hard work under privations, and the other falls to pieces when put to the test.

We must remember, however, that good and bad points are all questions of degree, and we cannot expect to find thousands of Transport animals all made to order. We must, therefore, learn to appreciate animals which are serviceable, notwithstanding a few bad points, and to reject those which, from glaring malformation or permanent unsoundness, would not pay for their keep in peace-time and would be only an encumbrance in war.

THE ELEPHANT.

This animal is fully treated on by Major Burn in his notes on Transport, pp. 52 to 114. Arguments for and against him are clearly detailed, and suitable instructions are given regarding his feeding and management in health and sickness. I would, however, emphasize the following points with regard to this animal.

He is very expensive to keep, except in countries abounding in forest, where he can be grazed on the branches and leaves of trees. He cannot stand extreme cold and is useless as a Transport animal in Afghanistan or Central Asia, both for this reason and from the fact that the country would not provide suitable grazing or dry forage sufficient to keep elephants in any numbers. We may, therefore, exclude this animal from our Transport calculations in the event of Indian Armies being mobilized for service in Afghanistan, Central Asia, Persia,

Expense of keeping elephants.

or Arabia. On the other hand, in countries like Assam, Burmah, and many parts of Madras, the elephant is a most useful Transport animal. He carries a heavy load, and on this account the baggage of troops carried by elephants occupies less depth in column than if carried by other pack-animals. In suitable countries their feed costs very little ; in fact where they can get a sufficiency of good grazing, the grain ration is hardly a necessity.

Mahouts and coolies.

The elephant is allowed two attendants—a mahout and a cooly. In many cases the mahout's duties are almost hereditary, and the knowledge of the proper care and treatment of the elephant is carried on from father to son by tradition. These men can often be trusted to take good care of their elephants, but the mahouts of the present day are a very mixed lot, and it is necessary that Transport Supervisors should have some knowledge of the animal and its requirements.

Age of elephants.

The elephant is full grown at about 25 years of age and is at his best on reaching 35 years. An elephant that has done hard work generally becomes worn out at between 60 and 70 years of age.

Make and shape.

A well-shaped elephant for pack-work should have short legs and strong limbs. The back should be flat and level from shoulder to croup ; an arched back is particularly liable to injury. The colour is, as a rule, almost black, and there are light-coloured spots on the trunk, neck, and ears. The elephant should have, in common with other Transport animals, a wide and deep chest and barrel ; this generally shows that the heart and lungs are healthy and have plenty of room to work in.

Guide to age.

The principal guide to the age of an elephant are the ears. During youth the upper edges of the ears are straight and smooth ; as the animal advances in age, these turn down and the edges become ragged. This is thought to be the result of wear and tear, as in health the elephant is constantly flapping his ears.

In a young animal the skin is smooth and glossy ; in old age it looks dry and wrinkled. In old age the head becomes lean and angular.

In a young elephant the eye is bright and clear, in old age it becomes dimmed. Male elephants are not now bought for Government purposes, as they are often very troublesome when they become *musth*.

Load for elephants.

The present authorized load for a first class elephant is 1,200 lbs., and for a second and third class elephant 960 lbs. The class depends upon the height of the animal measured from the ground to the withers. Those of 8½ feet and over are large, under 8½ feet medium, under 7½ feet small elephants.

Elephants are measured on the 1st of April annually, and the increase in the height of any elephant is noted in the elephant register, so that their rations may be increased when they reach the next higher class.

Rations for elephants.

The scale of rations for elephants is shown in Appendices 38 and 39 of Vol. V, A.R.I.

Fodder.

The favorite fodder of the elephant is the green reeds and grasses growing in tanks and swampy ground, plantain leaves and stalks, green rice straw, sugarcane, and all good upland grasses. Of trees, they eat the leaves and twigs of the bur or banyan tree, the babul tree, the jackfruit tree, bamboo leaves and twigs and other trees with which it is not necessary to burden our memories.

The leaves and twigs of the pepul tree must be cautiously given as they are said to produce inflammation of the eyes. Elephants will also readily eat green or dry kurbee (chari), which are the stalks of the jowaree, bajri, or maize plants ; also dry hay if it is well cured and palatable. As will be seen from the Government allowances of forage, elephants require a large quantity of fodder to keep them going. They are also fond of lucerne and guinea grass, but these are, as a rule, too expensive for elephant's food. Burn on pp. 59, 60, and 61 gives full details of the different trees and leaves which are safe for elephants to eat. He also lays great stress on the necessity of elephants having time to eat and sleep, and this can only be obtained by getting the animal's fodder as soon as possible after arrival in camp, so that he can fill himself up by ten or eleven o'clock at night and then take four or five hours' sleep.

Grain ration.

The grain ration of elephants generally consists of unhusked rice or flour ; the flour is made into large *chupatties* or unleavened cakes.

Water.

Elephants should be watered twice daily and, whenever possible, they should be bathed daily, but not when they are in a heated state.

Liability to chills.

Elephants often incur bad chills from swimming rivers on the march before they have had time to cool.

Grooming.

The grooming of the elephant consists in scrubbing the body with a wisp of cocoanut fibre or a special kind of soft stone, water being poured over the animal at the same time.

[NOTE.—Patterns of the different articles of elephant gear are now required for illustration.]

Scale of gear.

The gear of the elephant is fully treated on in Sanderson's " Pack Gear for Elephants." The point of principal importance is the pack-saddle. About the year 1880 the late Mr. Sanderson took this question up, and the result of his researches is embodied in his valuable treatise. The old pattern of saddle used for Government elephants pressed on the spine, and the animals were constantly suffering from aggravated sore backs.

Sanderson's improved pattern saddle is now used for Government elephants throughout India and consists of—

(*a*) A *gadela* or *numbda* 4 inches thick, made of layers of strong soft *numbda* quilted together and covered with strong cloth.

(*b*) A *gadi* or saddle-pad stuffed with reeds and open in the centre so as to protect the spine from pressure.

(*c*) An iron saddle or load-guard wrapped with rope which further protects the spine from injury and forms a secure attachment for the girth, breeching and neck rope.

The girth is made of plaited cord and has an arrangement for retightening on the march without removing the load.

The neck-rope and crupper prevent fore and aft motion of the load and saddle. The dock of the crupper is formed by a piece of bent iron pipe through which the crupper rope runs.

The above equipment is very complete and seldom galls the animal. The gear to which Burn refers at p. 105 is now obsolete.

The remaining gear allowed for elephants is shown in Appendix 43, Vol. V, A.R.I.

It is of the greatest importance that the *gadi* and *gadela* should always be kept in thorough repair.

The *gadi* must be well stuffed with reeds, and the *gadela* must be kept dry and clean.

Pace of an elephant.

The pace of a loaded elephant averages 3 to 3½ miles an hour. He cannot jump or spring, and a ditch 6 feet wide and 6 feet deep is impassable for him.

In cold weather the elephant requires to be jhooled at night.

Diseases of elephants.

The elephant suffers from a variety of diseases, which are fully detailed in Burn's book, pages 64 to 98, and also by Ryland, pages 120 to 134, but the following may be mentioned as being especially worth notice.

Debility.

Debility resulting in dropsy or zharbad. There are many causes which give rise to want of condition in the elephant. Over-work, under-feeding, the use of indigestible fodder, disorders of internal organs (such as the liver), and internal parasites, all tend to give rise to gradually increasing emaciation. The face and trunk become diminished in size, the hollows in the temples increase considerably, and the patient shows weakness and listlessness. The skin becomes dry, rough, and scaly. The appetite is capricious and often depraved, and the animal eats earth.

As the disease advances and the blood becomes impoverished by an increase of its watery elements, the limbs swell up, the swelling often extending to the throat and neck and the lower part of the chest and belly.

As a cure for the first stage of this disease Sanderson suggests freedom from all unnecessary restraint and liberty to graze at will, or, if that be impossible, a thorough change of food from dry to green or *vice versâ*, according to what the animal has been having when the disease appeared ; also protection from all debilitating causes, such as exposure to the sun or inclement weather. The animal should be kept under cover, but given exercise daily. As regards tonics, half an ounce of quinine, or an ounce of sulphate of iron, might be given twice daily for a week.

Rheumatism.

Rheumatism principally affects the shoulders and other joints. It is a common disorder especially on the march and arises in the rainy season from exposure to cold and wet. It is also caused by animals being watered and bathed when heated. For treatment keep the animal dry and warm and foment the affected part.

Colic, caused by sudden chills or eating unsuitable fodder, is shown by spasmodic pains in the belly. For treatment it is best to give an enema and to foment the abdomen thoroughly.

Colic.

Veterinary Captain Nunn, in an article on this subject to the Quarterly Veterinary Journal, recommends the employment of a fire-engine for the administration of an enema to the elephant, and states that water can safely be pumped for some minutes.

Musthi is a period of feverish excitement in male elephants, which comes on at various periods and lasts from six weeks to two months. When an elephant is in this state, an oily substance flows from a small hole near the temple. In some animals musthi comes on yearly, in others at longer periods. Some male elephants hardly ever become musth. If the animal is inclined to be vicious, he must be carefully secured, and the attendants must be careful not to risk their safety when feeding and watering him. The sight of a spear in an attendant's hand will keep most elephants quiet after they have once felt a prick. Europeans and Natives dressed in military uniform should be careful not to come within reach of musth elephants, as the uniform is generally new to them and seems to excite them.

Musthi.

As regards treatment of the musth elephant, if he is in good condition, deprivation of the flour or rice ration will have a good effect in reducing the feverish symptoms. One author suggests as a remedy a mixture of ghee or butter, wheat-flour, onions and sugar. This also sounds like the materials necessary to strengthen the mahout for the dangerous work of attending a musth elephant. Very possibly this mixture may have a good effect on a musth elephant, but I should recommend you to see personally that he gets it if it is ordered for him.

Treatment of musth elephants.

Chills (*chowrung*) is caused by elephants crossing rivers when in a heated state. The animal gets cramped in his limbs. Warm clothing and a dose of 4 ounces of any spirit will generally pull him round, but having once suffered from this disease, he becomes predisposed to it.

Chills.

Chowrung can be avoided by not allowing elephants to enter or cross rivers before their bodies have cooled.

Lungum is diarrhœa caused by the presence of parasites or flukes in the intestines. Most elephants have some of these flukes in them, and when they become numerous and cause much irritation, purging sets in and the flukes are evacuated.

Lungum (diarrhœa).

In a few cases the constitution of the elephant is not strong enough to resist the disease, and he succumbs to the drain on his system caused by the parasites and the subsequent profuse diarrhœa.

The symptoms of lungum are those of ordinary diarrhœa of a severe and persistent character preceded by a tendency to eat earth. It is most probable that the elephant eats earth by instinct so as to cause purgation and free himself of the flukes.

For treatment the grain or flour ration should be stopped, the animal should be allowed to eat earth freely and be liberally supplied with salt. All fæcal matter should be burnt so as to ensure the destruction of the parasite and its eggs.

Treatment for lungum.

The weakness resulting from lungum should be treated as already directed for debility.

The elephant sometimes suffers from diarrhœa unconnected with the presence of parasites in the intestines. Care should be exercised in checking diarrhœa as it may be a natural effort of the system to remove some obstruction or throw off impurities. Stop the grain ration and give fodder which can be easily digested, such as lucerne or guinea grass, young sugarcane or ordinary green grass. If the diarrhœa does not cease in a couple of days, give the following astringent medicine as recommended by Ryland :—

Opium, three ounces .....
Catechu, eight ounces .....
Chalk (powdered), one lb. .....
Coarse Sugar, one lb .....

Mix and divide into four balls ; give one at once and repeat every four hours till the disease is checked or the whole are taken.

The above remedy is also useful in "lungum" if the animal's strength is much reduced by continued purgation.

Diseases of the foot.

The elephant suffers from some diseases of the foot which are worth mentioning.

He should, whenever possible, be picketed on high dry ground, and in permanent lines his standing should be kept dry and clean. Under these circumstances the soles of the feet remain hard and tough, but when the animal is constantly picketed on soft, wet ground or dirty moist standings, the feet become soft and tender, and when the elephant is put to work on hard roads and stony ground, considerable lameness often ensues as a result of injuries to the deeper seated and more sensitive parts.

Cure is effected by resting the elephant and bathing the feet with alum water, which is an astringent and hardens the soles of the feet :

Treatment.

Alum ... one ounce.
Water ... one pint.

Before marching on hilly and stony roads, the precaution is usually taken of applying to the soles of the feet an astringent dressing called "Chobe." Mahouts generally propose an immense variety of ingredients for the chobe, not forgetting sugar and suet. The following will, however, generally suffice for one elephant (Steel) :—

Astringent lotion.

"Chobe."

Catechu (Katha), powdered ..... 12 oz.
Wax ..... 2 lbs.
Jinjili or sweet oil ..... 4 ,,

Melt together and apply night and morning after having first cleansed the cracks or crevices of the feet of mud and sand by washing.

To apply the chobe, hit the soles of the feet gently for a few minutes with a piece of rag fastened to a stick and soaked in the application.

Abscess in the foot.

Abscess in the foot is often met with and is the result of thorns or stumps of wood penetrating the horny sole (Steel). In severe cases there is extreme lameness and pain and the foot is much inflamed. The animal blows water over it with his trunk to cool it.

Quittor.

If the disease is neglected, matter spreads inside and above the sole of the foot. This condition is called quittor.

Treatment.

The treatment consists in making an opening in the sole of the foot to allow of matter escaping, and the foot should then be poulticed and fomented.

The foot must be kept perfectly clean, and camphor liniment should be applied to keep off flies. Carbolic lotion should be injected into the wound. While the disease lasts, the foot must be protected by a leather bag to keep out dirt.

Cracked heels.

Bad cases of cracked soles and cracked heels require to be first cleansed by poultices and then treated with carbolised zinc lotion.

Sulphate of Zinc...	2 drachms.
Carbolic Acid	4 „
Water	1 pint.

It will be noted that almost all the diseases enumerated above are preventable and are due to want of cleanliness and bad management.

Capped elbow.

Capped elbow is a constant source of trouble. When an elephant sits down to be saddled or to receive its load, the mahout should always place a folded jhool under the elbows.

How to prevent tumours.

Neglect to do this often causes tumours on the point of the elbow. On the first sign of tenderness coming, the mahout should make two bags about 18 inches square. These should be well stuffed with straw, coir, or wool and always placed under the elbows when the elephant sits down to receive his load. If this is not done, obstinate tumours form, which have to be opened and take some time in healing, meanwhile incapacitating the animal for pack-work.

When an abscess is opened, it should be kept clean ; the wound should be covered with antiseptics, such as Stockholm tar mixed with lard or carbolic oil. The wound must be kept covered to prevent the elephant throwing dust over it.

Saddle galls.

Saddle Galls generally take the form of abscesses under the skin and temporarily incapacitate the animal for work. Sometimes the galls are open wounds.

Causes of galls.

Causes—(1). From the saddle not being securely fastened on and shifting as the animal moves.

(2). Shifting of the load causing uneven pressure, or by a badly-distributed load.

(3). Mahouts have been known to wilfully gall their animals before or during a march by the insertion of a stone or other irritant between the saddle and the back. This would save the mahout the trouble of loading his animal every morning.

Since the introduction of Sanderson's pattern pack saddle, the number of galls has been considerably reduced, but elephants are still liable to gall just behind the upper part of the shoulder blades.

Saddles.

As before stated, the old pattern saddles did not suit elephants with arched backs. They caused terrible galls with sinuses or matter channels running along the ridge of the back, but Sanderson's pattern *gadi* or pad being open over the dorsal ridge, these wounds do not often occur. The chief feature of galls and abscesses in the elephant is the extraordinary amount of pus which is formed.

Sanderson's pad.

Treatment of galls.

Treatment consists in opening wounds so as to obtain drainage for the escape of the pus. All sinuses should be carefully syringed out daily with carbolic oil or carbolic lotion. Wounds should be kept covered up to prevent the access of dust or dirt, such as elephants constantly throw over their bodies, especially on any parts which are the seat of irritation (Steel).

Dressing wounds.

Elephants should be made to lie down while wounds are being operated on or dressed; they are generally very brave and patient, and the mahout or cooly sits on their heads and talks to them and encourages them while the dressing is going on.

An elephant should be given a small ball of coarse sugar after each dressing as a reward for pluck and patience.

Medicines for the elephant are prepared with coarse sugar or spices palatable to the animal and may be given either as a ball or in a chupatti (flour cake); the latter is eaten in the usual way, the former is introduced as far back as possible into the mouth either as it is or folded in a plantain leaf.

Poulticing and fomentation.

Poulticing and Fomentation (Burn). Poulticing an elephant is a formidable operation, as requiring often a large bulk of substance. A bag filled with bran may be used in case of a sore back.

Materials for poultices.

A very useful substance for poultices is the prickly cactus freed from its thorns and well bruised.

Fomentation.

When it is wished to foment the back and sides of an elephant, a flannel cloth or a rug should be first thrown over the back and the ends tied together beneath the abdomen. Hot water should then be applied to the covering, which will soon become saturated, and the continued application of hot water will keep up the temperature of the water, which the thickness of the cloth will prevent immediately becoming reduced.

The treatment of the diseases of elephants must be further guided by the general principles, which will be given in a subsequent lecture, for the treatment of sick transport animals.

Other general rules regarding elephants will be found in paragraphs 1835 to 1846 and 2020 to 2034, Vol. VI, A.R.I.

The general subject of fitting saddlery and loading will be dealt with in subsequent lectures.

LECTURE V.

Transport Animals: their Uses, Make, Shape, &c.

The Camel.

It was pointed out in the first lecture that, in addition to our mules, we shall want for any extensive movements under service conditions a large number of supplementary animals, and of these, camels will form a large proportion. Steel, in the introduction to his book on the camel, makes the following very pertinent and interesting remarks :—

Extract from Steel on the Camel.

" In dealing with a subject so large and so interesting as the camel, one " hardly knows where to begin and where to leave off. " It is extraordinary how various estimates have been " formed of his value. Mahomed says of him that he is " the greatest of all the blessings given by Allah to mankind ; recent writers " have represented him as ugly, spiteful, unreliable at work, stupidly phleg- " matic, malodorous, and endowed with all the bad qualities under the sun ; " his very virtues, especially steady endurance of excessive toil, being attribut- " ed to want of sensibility and of even the faintest gleams of intelligence. " The songs of the Arab of the desert are about the camel as of one of the " most beautiful of created beings ; the remarks of the British Soldier and " Regimental Transport Officer about his baggage camels are not fit for ears " polite ! Who is right and who is wrong ? We can have no hesitation in " taking the side of the Arab. Still there is some excuse for the recent " military opinion on this subject, because undoubtedly in the Soudan, along " the Nile, and in Afghanistan, camel transport has not been a success, and " the poor beasts have died wholesale as a rule. The Russians in Central " Asia, the French in Algeria, and recently the Italians in Massowah have " been quite as unsuccessful as we have been in our various campaigns as " regards keeping camels in health and efficiency. Individual officers have " solved the problem of how to keep camels at work and to prove them " valuable on a campaign ; but our troops have most certainly not been suc- " cessful; however, surely if over-laden animals have not their saddles removed " for a fortnight, we cannot wonder to find horrible sores on their backs ; " if animals remain ungroomed and tied up in lines or on the march for " months together, we cannot wonder if they get mange in an aggravated " form ; and if animals get no food nor water for a week, we cannot wonder " that they at last fall and die under their heavy burdens. To sum the matter " up in a few words. If men have in war emergency suddenly to deal with " an animal about which they know nothing whatever, the animal must not " be blamed that the results are not altogether satisfactory.

" The knowledge of the camel possessed by the untravelled Briton is easily " summed up :

THE CAMEL.

" Firstly, he is certain that the animal is the 'ship of the desert.'

" Secondly, that it has something to do with the eye of a needle.

" Thirdly (and most positively), that it is a sort of travelling reservoir, " consisting of inexhaustible water-tanks and never needs to drink.

" Fourthly, it has a hump and long legs and neck.

" Finally, it is an uncanny brute of strange habits, suited only to the " wandering Bedouin of the desert and the inimitable Barnum. When " called on in the emergencies of service to take charge of camels, the " principle an Englishman works on is to treat them as much as possible like " the beast of burden with which he is most familiar—the horse. Where this " has been carried out thoroughly, the results have not been unsatisfactory, " for, when groomed regularly, the camel does not get mange; when properly " saddled and loaded, he does not get sore back; and when properly fed and " watered, he remains serviceable and does good work. It is when one " soldier is given several camels to take care of and is aided only by a lot " of lazy, cowardly coolies who know as little about a camel as he does and " have no intention of trying to do anything whatsoever for their pay that " the poor camels fail.

" The water-tank theory is an unfortunate one. Certainly a camel can go " for some days without water when properly cared for, but he ought to be " watered once a day whenever possible and stinted in this respect only in " extreme emergency. There are pouches in his stomach, and they are " frequently, after death, found to contain fluid, but that they are reservoirs " pure and simple is doubtful; and it is very certain that the parched traveller, " who has to cut open his dying camel and obtain its accumulated stores " of water, will thus procure only a very little fluid of a temperature of " about 90° Fahr., a mawkish sub-acid flavour, and an unpleasant odour. " It is evident that the time-honoured water-tank theory needs much modifi- " cation and is a dangerous one to insist on as a guide to practice during " campaigns."

Burn on the Camel.

Burn also dilates on the advantages and disadvantages of the camel as a transport animal, and his notes on this animal, pages 115 to 179, may be read with advantage.

As regards the camel's utility, we may sum up by saying that the records of every campaign for the last sixty years show that the camel has been more or less a failure as a military transport animal. The story is told in a few words and repeats itself over and over again.

Bad selection.
Immature animals.
Want of supervision.
Stinted and impure water.
Bad feeding.
Cruelty and neglect.
Over-taxed strength.
Death.

THE CAMEL.

We have not improved as we have gone on. We lost more than 40,000 camels in the last Afghan War, 1878—80. In the Nile expedition of 1884-85, 4,000 out of 7,000 died in a few months. The mortality among camels in the Eastern Soudan in 1885 was also very great.

Number of camels lost in the Afghan War.

Nor have other nations done better than ourselves.

Skobeloff, the Russian General, lost 12,246 camels out of 12,596 in his Central Asian Campaign in 1880, and the Italians have been very unfortunate with their camels at Massowah in the Red Sea.

Camel mortality among the Russians in Central Asia.

With these data before us the outlook is not hopeful, but still we must have camels if we go to war, and with previous experience to warn us, we should do our best to learn what we can about this animal and his requirements. This, however, is attended by considerable difficulty, as hardly any Government camels are maintained in India in peace-time and very few officers have the opportunity of observing their habits and wants. It is, of course, useful to obtain information about camels from books, but knowledge thus procured requires practical application to make it complete.

This we can partly do here by hiring one or two animals for a few days and instructing you in their make and shape, signs of age, their equipment and loading.

Different breeds.

The experience of camels in expeditions made by an Indian Army would probably be confined to the following breeds :—

Punjab, Sind, and North-West Provinces Camel.

A.—The Punjab, Sind and North-West Provinces camel, a large animal with a short coat, accustomed to a hot, dry climate, and susceptible to extreme cold.

Afghan Camel.

B.—The Afghan camel, a short-legged, stout animal with a long coat. He can stand extreme cold, but would not thrive in extreme heat.

Arabian Camel.

C.—The South Arabian and Soudan camel, a small blood-looking animal with a very short fine coat. He can stand heat well, but, being a native of a hot country, is susceptible to extreme cold.

Egyptian Camel.

D.—The baggage camel of Northern Egypt may be classed with, and calls for the same remarks as, the Punjabi camel.

Persian Baggage Camel.

E.—The Persian baggage camel found in the hot plains of Persia is much the same as the Punjabi camel ; the Persian hill camel is like the Afghan breed.

All the above are one-humped camels.

The Bactrian or two-humped camel is short, compact, and very strong. He has very long hair and is found in Asia Minor, Central Asia, and Thibet. He is a good worker in hills and is suited to cold climates. He is heavily made and is essentially a baggage animal.

Bactrian Camel.

From the above description it will be seen that the camel is a difficult animal to work out of his native country, unless the climate to which he is taken is similar to his own.

Susceptibility to change of climate.

The Indian camel will not stand the rigour of an Afghan or Central Asian winter unless he is sheltered and well cared for, nor can he cope with the difficulties of up-hill or down-hill roads across passes which could be easily traversed by a hill camel. On the other hand, a hill camel does not do well in extreme heat. The Afghan trader brings his camels to the Punjab in the cold weather, but retires to a cool climate before the hot weather sets in.

Grazing.

The native of India does not as a rule attempt to work his camels during the hot season, but turns them out to graze. The health of an Indian or Afghan camel chiefly depends on his getting several hours' grazing every day, and consequently camel-owners generally march by night. When camels are hard worked, a ration of grain and dry fodder is required in addition to the grazing. It is difficult to march them with troops during the day and keep them in health, as they do not care to graze at night. Consequently it is probable that the camel will in future be used as a convoy animal working up stores on the lines of communication and starting and halting at convenient hours ; while regiments will as far as possible be supplied with mules for the carriage of their baggage and camp equipage. At this sort of convoy work a camel can traverse 12 to 15 miles a day with ease.

Length of marches.

The camel is certainly an ugly animal to look at at the first glance, but he has also good points. The stout short-legged Afghan camel is often a picture of strength, but the general tendency of the animal is to have power in the forehand and to fall off behind the hump.

Extract from Steel on the Camel.

Steel says, " When we look carefully at the camel, we remark that for a " ruminant he has a remarkably small belly and a very " equine chest, that is to say, he has some of the endu- " rance of the ruminant combined with some of the " excellent respiratory capacity for which the horse is pre-eminent. The " skin pads indicate and probably (by evolution) result from the useful habits " of camels lying down to receive their loads and assuming the recumbent " posture without removal of the loads during halts, the former tending to " our convenience and the latter to the animal's power of endurance. What " we are at first sight apt to consider unsightly features, thus examined from " a utilitarian point of view, are found to be beauties."

(NOTE.—The above passage may be paraphrased into simple English, so that it will be thoroughly understood by non-commissioned officers and men.)

Make and shape of camels.

We also notice in a camel his long ungainly neck and soft spongy feet. These also have their uses. His long neck enables him to reach and select his food and his feet are formed so as to move with ease over sandy roads which are so trying for small-footed animals. A camel, from the formation of his feet, finds great difficulty in moving on wet, slippery ground.

A camel is not fit for hard work until he is six years old.

Age. He is in his prime at 10 years if he has not been worked too young, and with fair treatment, will work on till he is 16 or 18.

Veterinary Surgeon Nunn says that camels have been known to live to 40 years.

Age at which purchased for Government. Camels purchased for the Army are to be between 6 and 8 years old and not less than 6½ feet high measured over the top of the shoulder.

Appendix 51-A of the Commissariat Field Service Code gives a scale of girth measurement in relation to height, both measurements being taken when the animal is sitting down.

Measurement.

In selecting a camel for purchase, after first deciding whether he is of suitable age and height (and not in calf if a cow-camel), we should note his condition and general state of health as shown by a full firm hump with plenty of muscle and flesh along either side of the spine.

The " quality " or good breeding of a camel is generally shown by a bright rather prominent eye, a small lean head and well-turned limbs. In almost all quadrupeds the large bright eye is a sign of good breeding. The underbred camel has a large coarse head with long pendant lips. Look critically at an animal which falls away badly behind the hump, *i. e.*, with a very light loin and drooping quarter. Put two men on his back and see whether he can rise up and sit down without undue trembling. See that his skin and hair are healthy and reject an animal with skin disease. Look out for scars on the back, and wounds concealed by hair pasted over them. Camel-dealers are adepts at this kind of trickery. Also look for firing marks on the legs, quarters, head, and breast-pad. In India and Afghanistan this generally means that the animal has suffered from lameness, rheumatism, or affections of the eye or brain. Burn (pp. 119—121) says that among the Soudan Arabs the various firing marks simply denote the different breeds or brands, but I should be inclined to accept this statement with caution if it came from a dealer. Examine the callous breast-pad and see that there is no swelling or abscess in it, also see that the elbows do not rub against the pad when the animal is in motion. See that the nostril is not torn ; this generally indicates that the animal has been hanging back on the march either from debility or from sluggishness. The back tendons of the legs should be clean and firm. The eye should be bright and free from white patches (opacities) on the surface of the eye-ball.

Signs of good breeding.

Test of strength.

Tricks of camel-dealers.

Firing marks.

Lameness is the manifestation in the act of progression by one or more of the limbs, of pain, weakness, inability, or impediment, and under this heading we may include " pointing " of the foot, any unnatural position assumed by the animal, and altered action which indicates unsoundness. Lameness must be very acute for the animal to show it at a walk ; as a rule the slow trot is the best pace at which to observe lameness (Hayes). Look for lameness in front when the animal is trotted to-

Lameness.

wards you. It is indicated by an uneven carriage of the head. The head will jerk up when the lame leg comes to the ground and will drop or nod when the sound leg comes to the ground (Fitzwygram). Lameness behind should be looked for when an animal is being trotted away from you. It is indicated by an uneven carriage of the hips. The hip on the lame side will be carried higher than the hip on the sound side for the simple reason that the animal favours the lame side and throws his weight upon the sound side. The hip on the lame side will also appear straighter and will be hitched up in action.

Notice when the camel is moving away from you whether the hocks brush against each other and reject him if they do. A camel moves at the walk at about 2½ miles an hour; if the country is at all hilly, the pace will be considerably reduced.

Pace of a camel.

AGEING THE CAMEL.

(NOTE.—*Ageing of Camels.* To illustrate the ageing of camels, 4 animals will be required. A 4-year old, a 5-year old, an 8-year old, and a 14-year old will sufficiently show the different stages of development of the teeth. The study of the 4 and 5-year old mouth will be a warning against the acceptance of immature animals.)

In common with other animals used for transport work, except the elephant, the main guide to the age of a camel consists in the indications given by the teeth. The teeth are divided into molars (the back teeth used for grinding), and the incisors or front teeth used for nipping the food. To these are added pointed teeth in each jaw which lie just behind the incisors and are called tushes. A mule, pony, and donkey have molar and incisor teeth in each jaw. The camel and bullock have incisor teeth in the lower jaw only.

Ageing by the teeth.

Again, all these teeth are divided into two classes—temporary and permanent; the temporary or milk teeth grow while the animal is young and are gradually shed and replaced by permanent teeth as he approaches maturity.

The centre pair of incisors are called "centrals;" the pair next the centrals are called "laterals" and the outermost incisors are called "corners." Steel's description of cameline dentition is the best available. A short summary is given on page 27 of his work, and Appendix V goes thoroughly into the subject.

At two years a camel has six temporary incisors in the lower jaw and one temporary tush on each side. Sometimes there is a pair of temporary tushes in the upper jaw.

2 years.

Some of these teeth are notched on the sides. These notches are caused by the camel breaking off twigs against the teeth.

At 4 years old there are two small temporary tushes in the upper jaw.

4 years.

The temporary incisor teeth and tushes of the lower jaw are much worn.

During the fifth year the temporary central incisors have been shed and are replaced by a pair of permanent teeth which now project from the gums.

5 years.

Six years—two more permanent teeth; the lateral incisors have now replaced their temporary predecessors.

6 years.

At 7 years the corner permanent incisors have appeared.

7 years.

Between 7 and 8 years the permanent tushes of the lower jaw are cut and are quickly followed by those of the upper jaw. The second pair of permanent tushes of the upper jaw are cut later on and are somewhat irregular in their time of appearance. The permanent incisors now become indented on their sides from browsing.

Permanent tushes.

9 years. At nine years the incisor teeth are beginning to show wear and are becoming flat on top.

10 years. At ten years the wear of the incisors is more marked and the tushes are slightly worn.

After ten years we find increased wear of the teeth. At fourteen or fifteen years all the incisors are worn flat and the tushes are quite blunt.

14 to 15 years.

Although it is easy for a camel-owner to keep a herd of 50 to 100 animals in good health and condition, they become very liable to disease when collected in large numbers for military purposes.

Management of camels.

In cantonments and standing camps particular attention should be paid to the cleanliness of the camel lines. All stones must be cleared away, as camels injure their breast pads and hocks where stones are left underneath them.

Necessity for cleanliness.

Daily grooming. The animals must be carefully groomed daily and precautions taken to prevent the accumulation of ticks on their bodies.

Separation into groups. Whenever possible, they should be separated into groups so as to prevent the rapid spread of contagion in the event of disease breaking out.

It is usual to picket camels in an oval camp with their heads towards the centre in which their forage is spread. About 25 camels make a suitable group, each animal occupying a space of about 4 feet in the line. Restive animals are secured by tying the foreleg above and below the knee.

Method of picketing camels.

Camels must be jhooled at night in cold weather. If kept on damp ground, they are liable to contract chills and lung disease which generally ends fatally. The saddle put on over the jhool on cold nights gives extra warmth.

Clothing in cold weather.

In cantonments the daily routine, which will be described for mules and bullocks, is also suitable to camels, the animals going to graze after morning stables when not required for work and being watered on their return from grazing in the afternoon.

Daily routine.

On the march before being sent out to graze after arrival in camp, they should be carefully examined as to freedom from saddle and rope galls, bruises of the feet, thorns in the footpads, and other contingencies frequent on the march. This is also the time to notice their condition, to look for traces of diarrhœa and a diminution of the hump. The nose should be examined as to its freedom from lacerations and the skin pads as to the absence of bruises.

Routine on the march.

As camels dislike drinking cold running water, still water in holes or tanks should be selected for them. A camel will drink dirty stagnant water, but pure water is, of course, preferable and desirable. Camels which are constantly grazing on succulent shoots do not require as much water as when fed on dry forage. A camel bred and worked in a fertile, well-watered country is watered almost as regularly as a horse, and it is an utter fallacy to suppose that such an animal can be at once marched over a burning desert for two or three days without water. Under these circumstances he will fail more quickly than a horse or a mule. In dry desert countries like Arabia and the Soudan the Arabs train their camels by stinting their water and allow them a full drink before starting on a journey.

Water.

Under these circumstances an average camel can work for three or four days without water, but he suffers greatly from the want of it. Instances are given of camels working in hot weather for ten days without water, but the work must have been light and they must have had grazing, which means that they were getting food and water at the same time. When the Arabs accomplish long distances on their camels without water, they trot them along in the morning, make a short halt during the heat of the day, and walk them along during the afternoon, allowing them to graze as they go. They halt about two hours before sun-set and allow their camels to graze. When marching with troops it would not be practicable to allow the camel to graze as he goes, and he would have to depend principally on grain and dry forage for his sustenance. Under these circumstances, if camels are to be kept alive for any time, water must be found for them daily; otherwise they will lose condition and die from debility or other disease.

Length of time possible for a camel to go without water.

Of course as Transport Officers we must be ready for exigencies and must be prepared to see our animals sacrificed on occasions of emergency, but this should not prevent us from knowing how to keep them in health and condition when time and opportunity offers.

The rations for camels in cantonments and on the march are laid down in Appendix 38, A.R.I., Vol. V. Grain should always be well ground and mixed with chaff or bhusa.

Rations for camels.

In permanent lines, mud troughs are made for the animals to feed from, but in their absence the feed should be laid out on the water-proof canvas, those animals which do not get on very well being hand-fed by the driver.

The dry fodder will consist of wheat bhúsa or barley bhúsa mixed with missa bhúsa; or hay and karbi. The green fodder will consist of grass, karbi green wheat or green barley. These will be all subsequently discussed in a lecture on forage. We must remember that a camel fed on dry forage must have plenty of water; otherwise impaction of the rumen is likely to result. It is for this reason that wheat bhúsa is never given as a whole ration, but is mixed with missa bhúsa, which is composed of the pods and stalks of chenna and different varieties of dhal and is more digestible than wheat bhúsa.

Steel says: "Camels will remain alive and capable of a certain amount of "work on the food obtained by grazing alone, but on "service they have not sufficient time to procure fodder

Grazing plants.

" and they require grain-food also as they are doing hard work and often arrive " in camp too tired to procure their living by grazing."

Camels turned out to graze seldom pick up poisonous herbs. They seem to have, in common with most other animals, an instinctive knowledge of what branches and shrubs are most suitable to them.

To a camel in his own country very few shrubs come amiss for grazing, but when turned out in foreign pastures he is often fastidious. In Sind the camels eat large quantities of a small acrid plant spoken of there as " bastard indigo.' The juice, although quite colourless when first expressed from the green pods, makes an indelible bluish stain on white cloth. One would think that such an acrid plant would be unsuitable for animals, but Sind camels thrive on it and seem to enjoy it.

When Indian camelmen cut green forage for their camels, they generally select the following branches :—

Banyán.
Ním.
Babúl and other acacias.
Pípal.

Camel gear.

(NOTE.—A set of camel gear should be laid out for inspection.)

Appendix 45, A. R. I., Vol. V, gives the scale of gear for camels supplied by the Commissariat Department.

One saddle	per camel.
One neck rope	
One crupper	
One girth rope	
One leading rope and headstall ...	
One loading net	
One loading rope	
One canvas sheet	
One jhool	
One brush	per five camels.
One currycomb	
One broom	per 25 camels or fraction of 25 camels quarterly.
One basket	

Camel saddle.

You will see that the saddle and its fittings are of a primitive description, involving constant repairs when used for rough work.

It seems strange that no better saddle has as yet been provided for pack camels in India.

The riding camel saddle for two men made by the Indian Ordnance Department is carefully adjusted and well finished, and the single riding saddles with appurtenances (illustrated by Burn, page 170), which were sent from England for the Camel Corps in Egypt in 1884, are complete and well worked out.

The Indian transport camel saddle is made of chut (goat's hair cloth) with a front arch consisting of two stout pieces of wood bolted together with wooden keys and lashed with string. To the sides of the pad are attached the bazdáns or pieces of bamboo for giving the saddle rigidity.

The pad is stuffed with rice straw for choice, sometimes with bhusa when rice straw is not available. On the march the stuffing requires constant attention ; galls generally occur on each side of the withers or on the loins.

When equipping newly-purchased camels the great difficulty is to get saddles to fit them. The sealed pattern fits a big Punjabi camel, but is too large for some other breeds, and it is difficult to get men sufficiently trained in camel-saddle-making to be trusted to deviate from the size of the sealed pattern to fit individual animals. It is intended (Field Commissariat Code, page 111,) that camels purchased on mobilisation shall be purchased complete with gear with a view to overcoming the difficulty of fitting saddles. Owners, however, soon learn to evade this and bring all their worn-out saddles and gear with the animals.

Difficulty of fitting camel saddles.

Girth rope.

The girth rope passes behind the chest-pad and is fastened to the upper bazdáns.

The breast-piece and crupper must be sufficiently tight to prevent much movement of the saddle when going up and down hill, but the hump really keeps the saddle in its place ; stuffing well under the front arch and turning up the saddle at the back to prevent loin galls are the two important points to be remembered.

Breast-piece.

The water-proof canvas protects the load from wet and also keeps the camel warm and dry at night.

It is usual in India to lead camels by a rope attached to a wooden peg passed through a hole bored in the nostril. This practice is now discouraged for Government transport, and whenever possible a headstall and leading rope only are used. Some camels, however, are refractory and require a nose-rope to keep them quiet.

Leading ropes.

The loading rope for a camel is 60 feet long, and its use, together with that of the loading net, will be subsequently illustrated when practising loading camels.

Appendix 51-A, page 478, of the Field Service Manual gives further particulars for guidance in selecting camels and details the countries and districts where they are obtainable.

Procurability of camels.

The following hints for the management of camel trains on the march may be here noted (these will be subsequently amplified in a lecture on " Transport Discipline on the March").

As stated before, a laden camel moves on level ground at about 2½ miles an hour. One driver is allowed to every three camels, and he must lead his own team himself. To save themselves trouble, camel drivers often fasten the head-rope of their leading camels to the camels in front of them and then wander along by the side of the road. In this way 15 or 20 camels are sometimes tied together, and if one takes fright or his load overbalances, there is a general block in the road. The leading rope of the second and third camel of each string is fastened to the crupper of the preceding animal.

Pace of a laden camel.

A train of 500 camels in single file will occupy one mile and a quarter of road. This is easily increased to two miles if the camels and drivers are tired. When marching with a convoy

Space occupied by 500 camels in single file.

independently of troops, get away as early as possible in the morning so as to get into camp at 10 or 11 at latest. If the weather is very hot and circumstances permit, it is best to march at night, arranging to arrive in camp just before daylight. The camels will then have plenty of time to graze. Before sending them to graze, give half the daily ration of grain and take the saddles off after their backs have cooled.

Advantages of marching by night.

It is not advisable to water camels on the road if you are sure of a good supply of the water at the next camp. Watering once a day at about 4 P. M. is sufficient. In the evening the camels should be groomed and their grain and fodder given them.

A healthy camel carries 400 lbs. or 5 maunds on service. We should however arrange to apportion lighter loads to those animals which lose condition, and thereby prevent their becoming further debilitated.

Load for camels.

The diseases of camels will be dealt with in a subsequent lecture in conjunction with the diseases of mules, ponies, and bullocks.

LECTURE VI.

Transport Animals: their uses, make, shape, etc.—contd.

THE PONY.

The Pony.

The pony, whether for pack or draught, is a most useful animal.

They are, however, not kept up as Indian Transport animals, except in Assam. The Indian pony was a failure in the Afghan War, but it was not his fault.

Indian Ponies in the Afghan War.

He was, in many instances, starved, over-worked, ill-treated and left in the open either unclothed or with insufficient clothing during the bitterly cold nights of an Afghan winter. His grain for the most part consisted of uncrushed barley and maize, a very indigestible dietary.

Stable management, supervision, and discipline were, as regards transport animals, generally conspicuous by their absence, and the pony was unable to resist such a combination of adverse circumstances. He fell off in condition, became jaundiced and hide-bound, and developed mange and other diseases. Unsatisfactory as previous experiences have been, we shall have to try again when the pinch comes, as it will be necessary for Government to buy ponies for any extended field operations.

The Native States of Gwalior and Jeypore now keep up pony cart trains as an Imperial Service reserve in case of emergencies, and there is really no reason why, with proper supervision and management, transport ponies should be less hardy on service than cavalry horses.

Pony Cart Trains in Native States.

Burn, pages 273 to 275, gives an account of the ponies ridden by the 19th Hussars in the Soudan in 1884-85; and the wonderful results achieved on these animals, without detriment to their health and utility, are well worthy of note as showing the value of ponies (they only averaged 14 hands in height) for military operations when entrusted to skilled hands capable of applying the resources of the moment to the preservation of their animals.

Ponies in the Soudan in 1884-85.

In the last Afghan War, 1878—1880, and the war preparations of 1885 we nearly cleared India of pack ponies. In addition to the ponies of the Punjab and North-West Provinces, large numbers of pack ponies were used and bred in the Bombay Presidency, notably in Khandeish, Kathiawar, and the Deccan tracts. Thousands were bought up for the Afghan War and never returned.

Although reduced in numbers, pack ponies are still used to a considerable extent in the Bombay Presidency, but there is not much scope for breeding, as so much grazing ground has now been put under cultivation.

The Indian pack pony is a hardy animal; he is used to hard work and short commons, and if we get them of the right shape and substance, they will not fail us if properly looked after.

Indian Pack Pony.

The Mule.

Himalayan Pony.

The hill ponies of the Himalayas are well known and are powerful, enduring animals.

Burman Pony.

The Burman pony, although very small, is a marvel of strength and can do as much work as the average Eastern horse.

Afghan Pony.

The Northern ponies of Beloochistan and Afghanistan are suitable animals for pack or draught work, and being natives of our probable field of future operations, we shall have acclimatized animals when we want them. If we were pressed for animals, a visit to Persia or Arabia would produce a fair number of useful transport ponies which are not now considered good enough for export to India as riding animals.

Pony-mares are never bought for service.

The Mule.

The Mule.

The Mule is, for general purposes, our best transport animal.

They are of two kinds :

(*a*) The produce of a pony-mare by a donkey-stallion.

(*b*) The produce of a donkey-mare by a pony-stallion.

Harvey Riley's Treatise on the Mule.

The best treatise on the mule is that written by Harvey Riley, Superintendent of the Government Corral at Washington, U. S. He was the Superintendent of the Transport of the Northern States during the American Civil War, which took place about 30 years ago.

His remarks are practical, outspoken and to the point, and Chapter II, pages 16 to 21, detail some of the difficulties with which he had to contend. Burn's remarks on the Mule, chapter VII, pages 253 to 269, give much useful information.

Sources from which Mules are obtained.

Mules for Indian transport are obtained from the following sources :—

The Punjab.	Persia.
Sind.	Arabia.
Beloochistan.	South Africa.

These are all useful animals, but the South African mules far excel the others in strength and substance, particularly in the good shape of the fore hand, the size of the stifles and gaskins, and the development of muscle inside the thighs—points in which most Asiatic mules are deficient.

Sources of supply in Europe.

Spain, Italy, and Cyprus are also good purchasing fields for mules, but the expense of freight to India is prohibitive, except under emergent circumstances. The transport mule is now used for draught as well as for pack-work, as it has been recognised that where the country to be traversed is at all practicable for carts, a mule or pony can draw on a very rough road, exclusive of the weight of the cart, more than double the load which he can carry on his back. On a level metalled road he can draw more than four times his pack-load.

The Mule.

Hardiness of the Mule.

The mule is certainly the hardiest transport animal we possess. He is less sensitive than the horse, and he seems to have taken his stand of pre-eminence as a transport animal principally on the ground that he can live through more ill usage than other animals. The mule is very sure-footed when moving at a walk, and his small tough feet are well suited for climbing rocky mountain paths.

He is wonderfully good at standing extremes of climate, and will keep fit for work under conditions which would debilitate other animals. His skin is tough, and he does not easily gall.

We must, however, remember that there is a limit to his endurance, and that he is made of the same materials as other animals.

If well cared for, he will repay us by keeping fit and doing good work, but he will surely succumb to continued neglect and ill-treatment.

Make and shape.

In speaking of make and shape, we will bracket the mule and pony, because the nearer a mule approaches the shape of a horse, the more valuable are the qualities united in him.

We will now summarise the points of a good mule or pony for pack or draught work.

To facilitate comparison with the live animal, a sketch is attached showing the outline and skeleton and giving the names of the different limbs and joints of the pony.

I may add that these limbs and joints are the same in all our transport animals, except the bullock and camel, which have duplicated bones below the fetlock joint, and the elephant, which has a knee in the hind leg, instead of a hock, and triplicate bones in the foot.

To procure a serviceable transport animal, we must in the first instance look for a compact frame on short legs.

Measuring.

When measuring mules, ponies, bullocks, and donkeys for height, the measurement is quoted in hands and inches, four inches making one hand, or roughly a hand's breadth.

The mule, pony, and donkey are measured from the ground to the highest point of the wither.

Maximum and minimum height for Mules and Ponies.

For a transport mule or pony 14 hands is considered the maximum height for general utility and 12 hands 1 inch is the minimum limit for peace time, although in cases of emergency the purchase of smaller animals may be specially sanctioned.

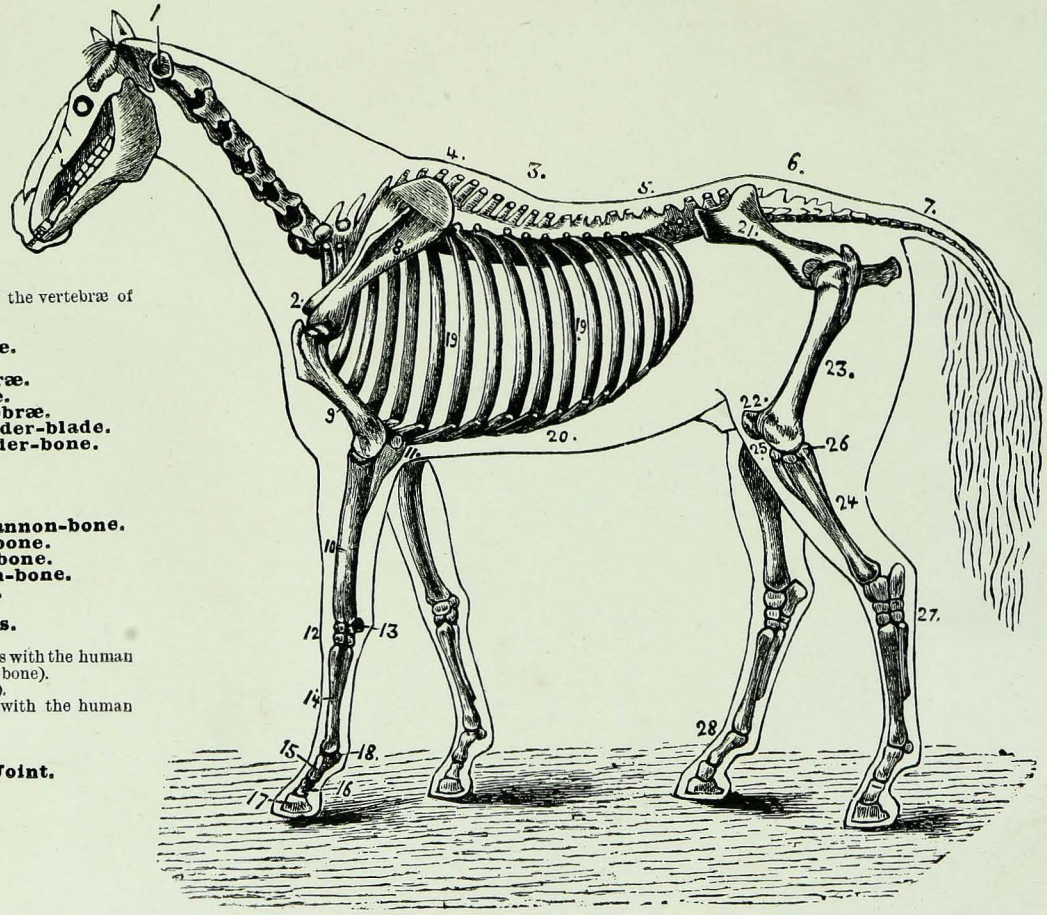
Girth.

The next point is good girth, which means depth and breadth of the chest cavity, and gives promise of strong, vigorous lung and heart.

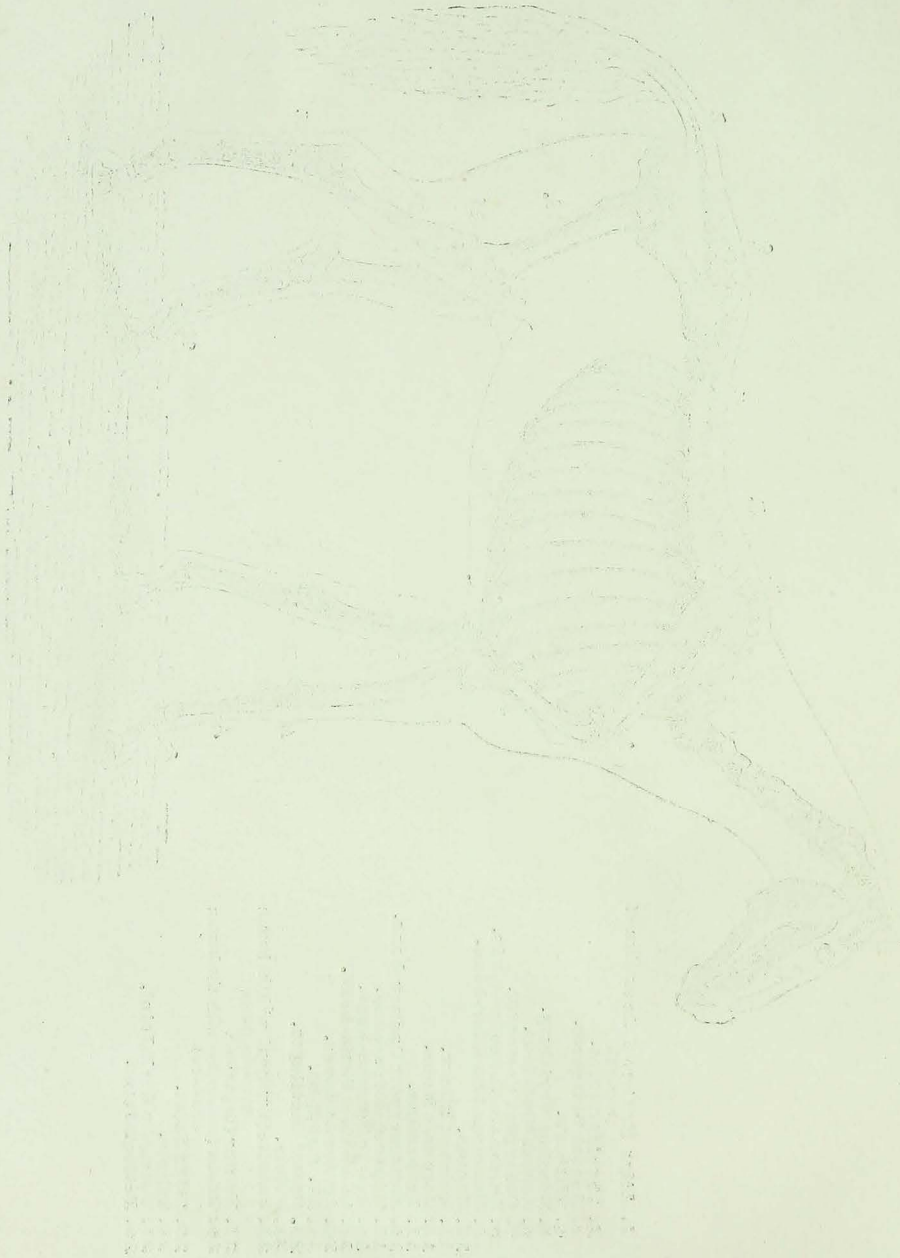
Shape of the back.

The shape of the back is also an important point. A long or hollow back is a weak formation.

You will see in the sketch that the vertebræ of the back have a natural slightly hollow curve, and that any exaggeration of this would indicate excessive weakness. Take an arch of a masonry bridge, turn it upside down and expect it to bear weight on its concave surfaces. This it would certainly not do.



1. **Atlas** (first bone of the vertebræ of the neck).
2. **Shoulder Joint.**
3. **Dorsal Vertebræ.**
4. **Withers.**
5. **Lumbar Vertebræ.**
6. **Sacral Vertebræ.**
7. **Coccygeal Vertebræ.**
8. **Scapula** or **Shoulder-blade.**
9. **Humerus Shoulder-bone.**
10. **Radius.**
11. **Point of Elbow.**
12. **Carpus** or **Knee.**
13. **Trapezium.**
14. **Metacarpal** or **Cannon-bone.**
15. **Upper Pastern-bone.**
16. **Lower Pastern-bone.**
17. **Os Pedis** or **Coffin-bone.**
18. **Sesamoid bones.**
19. **19. The Ribs.**
20. **Costal Cartilages.**
21. **Pelvis.**
22. **Patella** (corresponds with the human knee-cap bone).
23. **Femur** (thigh bone).
24. **Tibia** (corresponds with the human shin-bone).
25. **Stifle Joint.**
26. **Fibula.**
27. **Tarsus** or **Hock Joint.**
28. **Fetlock Joint.**



Of course this is an exaggerated example, as the vertebræ of an animal's back, however hollow the conformation may be, are bound together by ligaments and will sustain a considerable weight.

Arched or roached back.

A slightly arched back denotes strength of that part, as being built on the principle of the arch, but it is too often accompanied by long legs, flat sides, and drooping quarters.

The level back, as shown in the sketch, is as good as can be wished for, but the mule is often inclined to have a slightly arched or "roach" back. This is no disadvantage if you have an ordnance saddle for him which divides over the back and does not touch the spine. With the ordinary native saddle, a roach back is from its very formation constantly liable to galls.

High withers.

High withers are a bad fault, as they are liable to gall; and a croup higher than the withers is objectionable, as with this formation the load is unduly forced forwards and the withers may be injured.

Barrel loins and ribs.

We now come to a combination of those excellent points;—

Broad, muscular loins.
Round barrel.
Deep back ribs.
Short space between the last rib and the hip-bone.

It has been said that an animal with these points well developed will live and thrive on a diet of brickbats and water. We will not go as far as this, but you will find that among hard-worked under-fed animals, those that keep their condition and always look hard and fit, have in nine cases out of ten, these good points well developed.

Moreover an animal thus shaped is generally good all round.

The Arab's opinion of a serviceable pony.

Ask a desert Arab how he gauges a good horse. He will place his little finger on the end of the horse's hip-bone and say, "When I place my finger here and cover three ribs with the span of my hand, I have got a good horse." He does not want a showy park hack; he cares little for minor unsoundness; he wants an animal that will carry him all day at a gallop over the sandy desert and that can outstay his pursuers in case he comes across enemies who give chase to him.

He says, "Give me a horse well ribbed up and he is almost sure to be good enough."

This is very true and we may be sure that we have got a thoroughly serviceable transport animal when to the above points we have added sloping shoulders, round barrel, broad quarters, and short sound, straight legs with good bone, hard clean sinews, and tough black feet.

The mules before you are respectively instances of good and light boned animals.

An animal carries weight with his legs and back and therefore they must be strong. Short cannon bones below the knee and hock show weight-carrying power if the tendons are good and hard.

(*Note.*—Here explain the expression "tied in below the knee.")

The Mule.

The theory has been advanced, and apparently with good reason, that an animal which has a tail thick at the root has also a powerful spinal column well knit together with thick strong ligaments and muscles.

Soundness in the mule and pony.

The question of soundness will be dealt with in a subsequent lecture.

Action of pack animals.

The utility of a pack animal is considerably influenced by its action.

The mule or pony with a long slashing walk jolts and shakes its load with each stride, and so does the animal with the native jig or rawal.

These paces are quite comfortable for a man riding because he has loins which give with the motion of the animal, but jerky action causes a load to rock backwards and forwards and sideways.

The best pace is a short, level, even step.

If the hocks are inclined to turn inwards, see that they do not knock against each other while the animal is in motion.

The breed of a mule or pony is also an important point. Endurance and courage are notable characteristics of well-bred animals, while laziness and a desire to save themselves mark the underbred ones.

Breeding an important point.

A well-bred animal will go till he drops ; a low-bred one will always stop in good time.

The one fights against difficulties, and the other yields to them. The signs of breeding are a small, lean head, open nostrils, broad forehead, large bright eyes, well-developed jowl, nicely turned limbs, well proportioned shape, and a fine soft coat.

The degree of fineness in the coat depends in a great measure on the breed.

The Indian plain pony has generally a short coat. Hill ponies have rough shaggy coats.

The hair of mules is long or short according to the climate in which they live. Stallions have shorter coats than geldings, but it may however be laid down as a rule that a healthy well-bred animal will have a soft shining coat irrespective of its length.

Age at which mules and ponies are fit for work.

A mule or pony is not really fit for hard work until he is 5 years of age.

Consequently, if he is bought at 4 years old, he becomes a really serviceable animal after a year's good feeding and management, accompanied by steady but not exhausting work.

Mules are not to be bought under 4 years or over 8.

Purchase of mules and ponies.

Appendix 51-A of the Commissariat Field Service Code gives full instructions for the purchase of mules and ponies, and you will see there that as ponies, if bought, will be required for immediate use, the limits of age are 5 and 10 years for this class of animal.

Limit of age for ponies.

The price of a good mule in the Punjab, 12 hands 2 inches in height, is about Rs. 150 and it costs the same to land a similar animal in India from Persia or Arabia.

The Bullock.

Gear of mule, pony, bullock and donkey.

The gear of the mule, pony, bullock, and donkey will form the subject of a future lecture.

Colour of mule or pony.

The colour of a mule or pony influences, to some extent, his working capabilities. Any colour will do as long as it is good of its kind, and the richness of the colour is maintained to the extremities.

Thus iron gray, dark bay, brown, and dun are all good colours and denote strong constitutions, but a washy chestnut or dun points to a weak constitution.

Load for a pack mule or pony.

A pack mule or pony carries 2 maunds, and one driver takes charge of 3 animals.

Load for a cart.

The load for a cart drawn by two mules or ponies is 8 maunds.

One driver is allowed for each cart with a pair of animals.

The Bullock.

The Bullock.

The bullock is an excellent transport animal; his steady pulling powers in draught are well known, and as a pack animal he is by no means to be despised.

The Persian nomads use their small bullocks for carrying loads over mountain tracks inaccessible to other pack animals, and the pack-bullock was largely used in our Indian wars at the end of the last and beginning of the present century.

Bullocks with the Duke of Wellington.

The Duke of Wellington made the care of his pack bullocks and drivers an object of personal consideration and supervison, with the result that brinjaris or professional bullock-drivers were glad to attach themselves to him and served contentedly with his troops, thereby greatly facilitating their mobility. Formerly, the whole carrying trade of Central and Southern India was in the hands of these brinjaris, but they have gradually given way to roads and railways. They still exist in some numbers throughout India, and in Central India herds of pack-bullocks, numbering as many as 400 and 500 animals, are still met with.

Indian bullock susceptible to cold.

The Indian bullock cannot as a rule stand the cold of an Afghan or Central Asian winter, although he would be useful there during the summer months if well fed and moderately worked.

The smaller Indian breeds seem to do best in cold climates and do not want as much food as the large animals, which fall to pieces if they do not get abundance of suitable food.

Pegu bullocks.

As a pack animal the bullock is slow and difficult to manage in the hands of unskilled drivers. A large number were bought in India, and supplied to the Manipur expedition in April and May 1891, but we have not yet heard whether they were found to be a success.

Mysore Cattle.

The Madras Presidency produces some of the finest bullocks in India. Their two best breeds are described by Ryland as follows:—

"*Mysore Cattle.*—The best blood and the gamest looking animals of the species in India.

The Bullock.

Gear of mule, pony, bullock, and donkey.

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Pack-bullocks.

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Mysore Cattle.

"*Mysore Cattle.*—The best blood and the gamest "looking animals of the species in India.

"Head long and tapering to the muzzle, which is usually black. Horns set "well back on crest of frontal bone; they spring close together like the horns "of a goat, then diverge and incline backwards with a graceful and gentle "sweep, black tipped and exceedingly sharp. Eyes quick and intelligent, but "neither large nor prominent. Ears yellow inside, neat and short for size of "animal. Tail nicely formed and tapering like a whip lash. Hump and dewlap "well developed. Back is straight from shoulder to loins, and then droops "somewhat abruptly. Hoofs are small, hard, and well formed. Ribs well "rounded and deep. Bones of legs fine, flat and clean. Altogether the Mysore "bullock looks built for speed.

Kistna Cattle.

"*Kistna Cattle.*—Bred along the banks and in the delta of the Kistna river. "They are animals of large size, though displaying great "symmetry.

"Horns short, thick, and flat. Eyes large, full, and black. Ears long and "drooping. Hair usually white. Dewlap and sheath deeply developed and "continuous, with their broad leg bones, very short below the knee and hoofs "with a perpendicular inclination instead of being long and flat; these animals "are specially suited for hard work on heavy soil."

Guzerat and Nimar Breeds.

The Bombay Presidency produces two excellent breeds of cattle, *viz.*, the Guzerat and the Nimar. The Guzerat cattle are very fine and attain to enormous size and weight, but they were not a success in the Afghan War, as they could not keep their condition in the cold weather. They are almost uniformly white with black points.

The Nimar breed are found in the districts round Khandwa and Hoshangabad and in the Bhopal territory. They are well-bred, compact and strong and do not run too large.

Colours—black, red, and dun generally dappled with white.

Horns are short and curved like our English highly-bred stock; they are inclined to be delicate, and *post mortem* examinations have revealed unsuspected tuberculosis (or lung disease) in animals which have died from other diseases or have been destroyed on account of incurable accidents.

Sind Bullocks.

The Sind bullock is very hardy, stout and compact and is a good worker.

They are accustomed to extremes of heat and cold, the temperature of many parts of Sind being subject to great varieties.

Deccan Bullock.

The Deccan bullock is as a rule compact and hardy; they are mostly white, but the other usual colours are very generally met with. In short, good bullocks can be obtained in numbers throughout India, but it is doubtful whether they can stand extreme cold even with the most careful management.

Bullocks bred at the Government Farm at Hissar.

Probably the best bullocks for Artillery and Transport work are bred at the Government Farm at Hissar. The officials there have opportunities of watching the results of cross-breeding and perpetuating the best and hardiest breeds. A bullock should have a compact, stout body on short legs.

The Bullock.

The signs of good breeding in a bullock are broad forehead, large and rather prominent eyes, a fine coat, thin deeply-dropped dewlap and sheath, and a thin tapering tail.

Signs of good breeding.

The signs of strength and endurance are good girth, short back, broad loins well ribbed up, and a long straight quarter.

Points denoting strength.

A bullock is a slack-loined animal compared to a mule or pony, and this fact must, of course, be taken into consideration when noting the distance between the hip-bone and the last rib.

Much of the attenuation of neck and shoulders seen in draught-bullocks is due to early castration, before the hump and the muscles of the neck and shoulders are well grown. These do not develop after castration ; consequently young bulls should not be castrated until 3 or 3½ years of age.

Ryland says that the fact of bulls in the Hissar Cattle Farm not being unsexed until they are 3½ years old accounts in a great measure for the superiority of the animals bred in that establishment.

Reject a bullock with a broken tail. It shows that he is a slug and that he has undergone severe tail-twisting.

Broken tail a bad sign.

As regards the bullock's working capacities, it must have been a surprise to most of us on first reaching India to note how a bullock could pull such heavy loads with a hard wooden yoke without having a permanently galled neck.

He has, however, a thicker and tougher skin than the mule or pony, and Ryland, quoting a Scotch authority, says : "All but a very small percentage of cattle in India have *jet black skins*, no matter what the colour of the hair above may be, and to this fact is attributed the powers of endurance which these animals possess of working with impunity for hours together in the intense heat of an Indian sun."

Toughness of the Bullock's skin.

A large number of reserve bullocks for siege trains is kept up in India. In peace-time these are looked after and utilised by the Commissariat Transport Department.

Reserve of bullocks for siege train.

Appendix 51-A of the Commissariat Field Service Code gives rules for the selection of Siege Train and Army Transport bullocks.

It will be seen that considerable latitude is given as regards measurements, but the minimum height for Siege Train bullocks is 12 hands 2 inches in Bengal and Madras, and 13 hands in Bombay, measuring from immediately behind the hump.

Bullocks purchased for Siege Train and Army Transport purposes must be from 4 to 6 years of age.

Limit of age.

The ageing and management of bullocks and detection of unsoundness will be subsequently dealt with.

The pace of a bullock is about 2 miles an hour. He carries 2 maunds as a pack-load, and a pair of bullocks in an Army Transport cart take a load of 10 maunds or 800 lbs. He is essentially a slow-moving animal as his lungs are less powerful, and his stomach much larger, than that of a mule or pony.

Pace of a bullock.

The Donkey.

The Donkey.

The donkey is undoubtedly an excellent pack animal and can hardly be matched for the facility with which he carries compact loads over mountain paths.

The Eastern donkey.

The Eastern donkey is unfortunately a very small animal, and for this reason is difficult to use either for draught or for carrying the various rather bulky packages which are inseparable from the baggage of troops.

In some countries where the breed and size of the ass are carefully studied, he becomes an excellent draught animal and is a model of general utility.

Donkeys imported from Europe.

Some of the large European breeds are imported into India for stud purposes both for mule-breeding and for improving the stamp of the Indian donkey. We cannot, however, afford to import them into India for transport purposes, and the breeds which we would meet with in the transport of an Indian Army would be most probably confined to the following :—

Punjab donkey.

The *Punjab donkey* is a strong, grayish coloured animal, and very good for pack-work.

He is difficult at first to keep in condition when purchased from his native owner. Owing to the peculiar system of neglect on which he has been brought up, he is at first unable to assimilate grain and grass, and he does not at first thrive in the confinement of the transport lines, having been accustomed in his leisure hours to roam at will, picking up a precarious living.

Indian donkeys inferior in respect of size and breeding.

The remainder of India hardly produces any donkeys suitable for transport purposes. They are wretched, weedy animals ; the best are those used for carrying sand, bricks, tiles and road metal, while the most abject specimens are to be seen moving with gypsy camps carrying their masters' portable grass huts with a forlorn-looking chicken tied on the top on their backs.

Insufficiently fed.

The Indian donkey-owner, whether a townsman or a gypsy, does not provide his donkey with many of the luxuries of life, a handful of rice husk in the evening being the sole addition which the animal receives to the scanty sustenance which he manages to pick up on a parched piece of common ground.

Donkeys of Egypt and Arabia.

In Egypt and Arabia the donkeys are well bred and well shaped, and they receive much better treatment than their Indian brother.

Bahrein, on the south-west shore of the Persian Gulf, has a splendid breed of large, white donkeys, very hardy and powerful. These are exported in large numbers to Bussorah and Baghdad as riding animals.

Persian donkeys.

The Persian donkey is strong and stout, being generally used for carrying water. In the country round Muscat there is a good and numerous breed of donkeys ; they are small, but very strong.

The above Persian and Arab donkeys could be imported into India in case of emergency without incurring an unreasonable expenditure.

The Donkey.

The Afghan donkey is as a rule superior to those procurable in India, and would form an important addition to our Transport should military operations take place in that country.

The Afghan donkey.

The donkey is, above all animals, a useful, patient slave. He is cheap to keep, and when once accustomed to confinement and civilized food, he will keep in good condition on small rations.

Owing to his tough skin he is not easily galled, and he would be an invaluable animal for work on lines of communication, carrying up to the front compact loads, such as grain, flour, and salt.

Donkeys are divided into two classes (A. R. I., Vol. 5, para. 2047): Those of 11 hands and upwards are 1st class; below that size are 2nd class.

A first class donkey carries a pack-load of 2 maunds, or 160 lbs. A second-class donkey 120 lbs.

Load for donkeys.

Their scale of ration is found in Appendix 38, A.R.I., Vol. V.

Ration.

One driver is allowed to every 5 pack donkeys.

The conformation of a donkey is very similar to that of a mule or pony. He has naturally a very straight shoulder, no withers, and his neck is set on very low between the shoulders; otherwise the points to be looked for which determine quality and endurance are much the same as those previously described for a good mule or pony.

Make and shape.

The ageing, management, and gear of the donkey will be dealt with in subsequent lectures.

LECTURE VII.

Ageing Mules, Ponies, Bullocks, and Donkeys.

[NOTE.—To illustrate this lecture the following animals will be required : 5 donkeys, mules, bullocks, and ponies of 2, 4, 6, 8, and 14 years respectively.]

Description of the teeth.

When speaking of the age of the Camel, three descriptions of teeth were mentioned, *viz.*, (*a*) the anterior incisor or cutting teeth, (*b*) the pointed tushes or canine teeth, (*c*) the back teeth, also called molars or grinders.

Ageing mules, ponies, and donkeys.

The teeth of mules, ponies and donkeys answer the same description.

The ages of these animals are mainly determined by the changes in and appearance of the teeth, and as these changes are almost identical in the mule, pony, and donkey, their ages will be spoken of collectively.

Teeth of the pony, mule, and donkey.—The anterior teeth are twelve in

Incisor teeth.

number—six in the upper and six in the lower jaw.

Tushes.

There are four tushes, one on each side of each jaw, about half an inch behind the corner front teeth of the lower jaw and one-and-a-half inches behind those of the upper jaw. Tushes are, as a rule, confined to the male animal. When they appear in females, they are of very small development.

The full-grown animal has also twenty-four grinders, making a total of 40

Molar teeth.

teeth. The teeth of these animals may further be sub-divided into temporary or milk teeth and permanent ones.

Twenty-four temporary teeth grow in the colt's mouth, namely, 6 inci-

Milk teeth.

sors in each jaw and 3 molars on each side of each jaw.

Permanent teeth.

These are afterwards replaced by permanent teeth. The tushes and the remaining twelve molars only appear as permanents.

The milk front teeth differ from the permanent ones in being much whiter, more wedge-shaped, and in not being grooved on their front surface ; the marks on their cutting surface are smaller in circumference and much more shallow ; the permanent front teeth are very nearly as broad at the neck (the part just above the gum) as they are on their cutting surface. The lower permanent front teeth have one vertical groove and the upper two similar grooves on their front faces (Hayes).

As regards the changes which occur in the mouth of the colt, we will not burden your memory with the molar teeth, but will refer only to the incisors and tushes, from which teeth the ages are generally determined.

The incisor teeth we will, for reference, divide into three pairs : the central

Sub-division of incisors.

pair are called the " Centrals," the two teeth next the central pair the " Laterals," and the two behind the laterals the " Corners."

At or shortly after birth the foal has a pair of "central" incisors in each jaw.

At about 2 months old the "laterals" appear in each jaw.

At about 9 months old the "corner" teeth come through.

The colt has now 12 incisor teeth and retains them all until he is nearly 2½ years old.

During this period, however, the teeth undergo changes which we must learn to recognize, or we should be mistaking yearlings for 2-year-olds and *vice versa*.

1 year. At a year old the corner teeth are shells and have no inner walls, and all the teeth are close together. At 2 years old the inner wall of the corner teeth has grown up level with the outer wall; the animal's jaw has grown, the teeth stand somewhat wide apart at their necks, and appear smaller than they did in the yearling.

2½ years. At about 2½ years old, the central milk teeth of each jaw fall out and permanent teeth begin to grow up in their places; they are well grown at 3 years, but have deep hollows on the top.

3½ years. At 3½ years old the lateral teeth fall out and are replaced by 4 permanent lateral incisors, which grow up by the time the animal is 4 years old. At this time the central incisors show slight signs of wear, and the tushes in each jaw show signs of breaking through the skin, sometimes putting an animal off his feed and causing feverish disturbance of the system.

4½ years. At 4½ years old the corner milk teeth disappear and the tushes are showing themselves.

5 years. At 5 years the corner permanent incisors have grown up, but those of the upper and lower jaw touch only at their anterior corners; the tushes are well grown up, the hollows or marks are beginning to wear out of the centres, and the laterals also show signs of wear. The tushes are pointed and have sharp edges at the front and back.

6 years. At 6 years the marks are wearing out of the centrals, the corner teeth of the upper and lower jaw meet over the whole of their cutting surface, and the tushes are slightly rounded on the front side.

7 years. At 7 years the mark has worn out of the "centrals" of the lower jaw and is but slightly defined in the "laterals." The points and and edges of the tushes are now no longer sharp.

8 years. At 8 years there are slight marks left in the corner teeth of the lower jaw; the tushes are now rounded and blunt. As a rule, the marks in the upper jaw remain 2 years longer than those in the lower one.

It will be noted that up to 6 years there can be little doubt as to the age of the animal, as we have the regular changes and growth of the teeth to guide us.

After this age the changes which occur are doubtful and liable to variation, and to guide us we must call to aid collateral appearances, of which the following should be noted.

At 8 and 9 years the teeth have grown perceptibly longer and begin to point outwards from the jaw. In the young animal the incisor teeth are arranged almost in the form of a semi-circle ; as he grows older, the semi-circle becomes straightened out, and in old animals the teeth are arranged almost in a straight line.

Changes in the appearance of the teeth after 8 years.

When first developed the permanent teeth are broad from side to side. At 9 years the cutting surface is much broader from front to back. At from 12 to 16 years it assumes a triangular shape.

In an old animal the gums recede and the teeth are much longer than in the young animal. In the young mouth the teeth grow up perpendicularly from the jaw ; in the old animal they protrude outwards.

Appendix 51-A, Commissariat Field Service Code, also gives some useful hints on the ageing of mules, ponies, donkeys, and bullocks. Hayes (pp. 512 to 518) details the periods at which all the teeth are cut, including molars. Fitzwygram (pp. 593 to 606) also deals thoroughly with the subject, and the drawings illustrating the dentition of the horse are very instructive.

It is often difficult to get hold of a shy young mule or pony to age it. The young mule is the worst, and when you have got a firm hold of his head, he will often try and hit you with his forefoot. To age a moderately quiet animal, stand on his near side. Place the left hand on the face half way between the nostrils and eyes to check him if he throws his head up. Place the first two fingers of the right hand in the mouth, resting them on the lower jaw in the space between the incisors and molars. Turn down the lower lip with the left thumb ; turn up the upper lip with the right thumb. The animal will now open his mouth and play with the two fingers resting on the jaw, thus disclosing to view all his incisors and tushes.

Method of examining an animal's mouth.

Never close the nostrils of a mule, pony, bullock, or donkey. These animals breathe through the nose, and not through the mouth ; consequently, when the nostrils are closed, they struggle to save themselves from suffocation. An exception may be made in the case of a bullock which turns sulky and will not get on its feet, although perfectly fresh and well. Close the nostrils and he will soon get up.

Inexpediency of closing the nostrils of a mule or pony.

We, most of us, have experience of the stray cow who eats our roses and prowls round to the stables after the horses' hay. We are sometimes fortunate enough to capture her, but on the way to the pound she often lies down and refuses to move notwithstanding the blows and threats of the mali or chowkidar. An infallible remedy is always at hand if you only know it. " Close her nostrils for 3 or 4 seconds and she will jump up!" She draws the line at suffocation, and so will the mule or pony, however quiet he may be under ordinary circumstances.

The above advice may appear irrelevant to the subject of ageing animals by their teeth, but it is while trying to see the teeth of a young animal that people often thoughtlessly close the nostrils and thus incite him to struggle.

The grinding surface of the lower molars slopes upwards and inwards, while the upper ones slope downwards and outwards. When grinding his food, the horse moves these teeth with a lateral and slightly rotatory motion, the cheeks and tongue keeping the food between the grinding surfaces.

Grinding surface of molars.

As animals advance in age, the inner edges of the lower molars often develop sharp spikes, and from the outer edges of the upper molars similar growths appear. These growths often lacerate the cheeks and tongue and interfere with the grinding power of the teeth ; consequently the food is not properly prepared for digestion before it is passed into the stomach. This is a frequent cause of indigestion and want of condition in animals over seven years of age.

The sharp points and edges must be filed down with the tooth rasp. In bad cases the teeth should be filed every other day for a week, and afterwards looked to once a month.

Use of the tooth rasp.

(NOTE.—The use of the tooth rasp to be practically illustrated.)

To examine the back teeth of an animal, take the tongue in the right hand knuckles upwards. If he struggles or backs, give with him and do not drag at the tongue. If he rears up, let go, or you may tear the tongue out of his mouth. Turn the right hand up and point the thumb, so that it touches the roof of the mouth. As long as you keep your hand in this position, the animal cannot close his jaws, and you can examine all the right side molars with your left hand without fear of injury.

Method of examining back teeth.

To examine the molars on the left side of the mouth, reverse the process, holding the tongue with the left hand and examining the teeth with the right hand.

The bullock, in common with the camel, sheep and deer, has no incisor teeth in the upper jaw. He has 8 incisor teeth in the lower jaw and 24 molars, *viz.*, six on each side of each jaw—total 32 teeth ; he has no tushes.

Ageing bullocks.

The milk incisor teeth are very small and with a little practise will be easily distinguished from the "permanents," which are much larger. The appearance and growth of the different teeth in the mouth is a fairly reliable guide to the age of the bullock, but varieties of breed and the quality of nourishment given to young animals have a marked effect in hastening or retarding dentition.

Milk teeth.

Bullocks which are much grazed on poor stony soil, where the grass is very short, show much more wear in their incisors than stall-fed animals of the same age.

The middle pair of incisors are called the "Centrals," those next the centrals are called the "Lateral centrals," the next pair "Laterals," and the outermost "Corners." The incisors have small fangs and are loosely fixed in the jaw. The upper jaw has a hard dental pad against which the food is pressed when cut by the incisors in grazing. The loose incisors give outwards when the mouth is closed, thus preventing laceration of the dental pad.

Sub-division of incisors in the bullock.

Dentition of the average Indian bullock.

The following is the average dentition of the Indian bullock when well nourished :—

At birth he has 4 temporary incisors.

At one month 8 temporary ditto. He has now his full number of milk incisors and does not lose any until one year and nine months, when the central pair fall out and 2 permanent teeth grow up instead.

2½ years.

At 2 years and 6 months the central lateral milk teeth disappear and are replaced by permanents.

3½ years.

4½ years.

At 3½ years the lateral milk teeth are replaced, and at 4 years and 6 months the corner permanent teeth appear and the bullock has his 8 permanent incisor teeth. The "centrals" and "central laterals" are well grown up and show signs of wear.

5 years.
6 years.

At 5 years the lateral permanents are well up, and at 6 the corners are nearly on a level with the other teeth.

Permanent molars.

At 5 years the bullock has 24 permanent molars. The wear of the incisors goes on increasing with age, and at 12 years the teeth are getting flat on the top and are short and discoloured.

Appearance of teeth in old age.

In old age the teeth are almost flat, are quite short, and lie close together in the mouth. These signs do not always accurately determine the age after the bullock has completed his 5th year, as so much depends on the use to which the teeth are put.

Ageing by the horns.

The horns also help to determine the age. Every year after 3 the horn has a notch on it rising from the base. By counting the notches and adding 3, the age is approximately arrived at.

Here again we may be easily at fault, as horn-scraping is almost universally practised in India, and notches become so faint that they can hardly be distinguished.

Difficulty in handling bullocks.

In ageing new bullocks we have also to contend with the fact that, having been brought up entirely amongst Natives, they are afraid of Europeans, and it is not easy to approach them.

Many bullocks will not even allow their Native owners to look at their teeth. If a bullock gives trouble, have his head tied up to a tree, blindfold him, make the owner open his mouth, and then go up quietly and look at his teeth. While doing this, look out for squalls, as sometimes the bullock catches a glimpse of you from under the cloth thrown over his eyes, or feeling a strange hand touching his mouth, makes a terrific plunge and casts himself free.

You must learn to accustom yourselves to take in the different signs of a bullock's teeth quickly, as you do not generally get an opportunity for prolonged observation.

LECTURE VIII.

Detection of Lameness and Ordinary Unsoundness.

NOTE.—For the illustration of this lecture, one or two slightly lame animals are requlred. Also instances of the following diseases :—

Eye—Cataract.
Opacity of cornea.
Teeth—A "parrot" mouth.
An instance of sharp, over-grown molars.
A case of roaring.
Capped elbow and hock.
Thoroughpin.
Splint.
Sprain of fetlock joint.
Sprain of back tendons and suspensory ligaments.
High ringbone.
Low ringbone.
Sidebone.
Laminitis (results of).
Thrush.
Spavin.
Dropped hip.

If illustrations of all the above unsoundnesses are not obtainable in the Transport Lines, they will almost always be found among the horses of a Battery or Cavalry Regiment, and can generally be obtained for illustration either by private arrangement with Officers Commanding or under the orders of the General Officer Commanding.

It is also necessary to have a skeleton of the fore and hind limbs of a mule and bullock, also fore and hind legs dissected down and dried so as to expose the principal tendons and cartilages of the limb. If well dried, they are quite inoffensive. They should be kept in places inaccessible to rats, etc.

The legs are easily procurable when animals die or are destroyed in the Transport lines.

The bones are obtained by boiling down the limb, and after being dried, they are bored and fastened together with wire in their proper places. This and the dissection of the limbs can generally be done by the salutri, and the Veterinary Surgeon in charge will always be found ready to help and advise regarding the setting up and preservation of the specimens.

Detection of lameness and unsoundness.

We will now proceed to the detection of lameness and unsoundness in the mule, pony, bullock, and donkey.

In this lecture and the lecture on stable management you will be told a good deal about the various ailments and accidents to which transport animals are subject.

Do not, however, think that we want to make Veterinary Surgeons of you. We simply want to put you in possession of some useful information which will enable you to see when your animals are out of health or otherwise injured. You will then be able to call in skilled veterinary aid instead of unwittingly allowing a sick animal to remain neglected and unnoticed until his increasing weakness and signs of extreme sickness force on your notice the fact that something is wrong.

Moreover on field service Veterinary Surgeons are very busy and can only visit the different hospitals once in two or three days.

Under these circumstances, if you can, by a judicious application of your knowledge, relieve animals which are only slightly indisposed, you will be making yourselves useful.

Salutris.

You will also be a check on your salutri. The salutris of our permanent establishment are fairly trustworthy and are as good as can be expected for the pay and position assigned to them. For field service however their numbers will be largely increased, and, as suitably trained salutris do not exist in India, except as permanent Government servants, it will be almost impossible to obtain well informed, capable, and trustworthy men.

Under these circumstances the knowledge of some sanitary principles and the detection and recognised treatment of a few simple diseases cannot fail to be most useful to you. Remember, however, that a little knowledge is liable to be a dangerous thing, and whenever possible, call in skilled assistance. On the other hand, when you are left to your own resources, do not let disease and suffering run on when you have in your hands the necessary appliances for affording relief.

Examination of Transport animals before going on Field Service.

There are other occasions on which veterinary knowledge will come in useful. Before transport animals are sent on field service, they are examined as to their fitness for hard work.

Now amongst the transport animals of a regiment or depôt there will always be a certain number of technically unsound animals. Many of these will, however, be practically sound, and some, from the particular nature of their unsoundness, will be unfit for field service, although not actually lame at the time of inspection.

Observant officers of great help to Veterinary Surgeons.

If you have applied your knowledge intelligently, you will be able to give the Veterinary Surgeon material assistance by furnishing information as to which of these animals can stand hard work without going lame. The Veterinary Surgeon, when examining a large number of animals, cannot know each one's previous history, and, in the absence of collateral evidence, he will have no other course open to him than to reject animals which have any unsoundness which is liable to cause their breakdown on service.

Detection of lameness.

When examining an animal for soundness, we should first have him trotted away from us, and then towards and past us, with a loose rein.

Note whether he is lame or sound, also whether he shows weakness in the loins or hind quarters, by dropping his quarters, when he turns ; also note whether he coughs.

We will now refer back to the remarks made about lameness and its detection when the subject of unsoundness in the camel was under consideration. These remarks apply equally to the pony, mule, bullock, and donkey.

Hayes, Chapter XVII, and Fitzwygram, Chapter XLII, give full information on the subject of lameness and its detection.

After trotting, we should examine the teeth and see that there are no malformations which would interfere with the animal when gathering and masticating his food.

Parrot-mouth.

The principal of these are when the mule, pony or donkey is "parrot-mouthed," *i.e.* when the upper front teeth protrude beyond the lower ones and grow very long.

Undershot jaw.

Similarly the lower front teeth sometimes protrude beyond the upper ones (undershot jaw). It will be readily understood that either of the above malformations might seriously interfere with the animal when grazing.

NOTE.—These malformations are comparatively common in mules, and there will be no difficulty in procuring illustrations.

Sharp molar teeth.

Next there are the sharp growths from the molars already spoken of when dealing with the subject of ageing by the teeth.

We should now stand in front of the animal and note whether there is any discharge from, or ulcers within, the nostrils.

Examination of the eye.

Whether the eyes are clear and bright and free from white specks or splashes either on the surface of, or within, the eyeball.

(For a good description of the Eye, see Fitzwygram, Chapter LVII.)

Examination of the limbs.

Whether the shoulders, arms, knees, cannon bones, fetlock joints, pasterns and feet are all pairs.

Any difference in these muscles, bones, and joints should be carefully noted.

If the muscles of one shoulder or arm are smaller than those of the other, it is most probable that disease has existed in the smaller limb and that its muscles have shrunk from want of use.

Dropped hip.

Still standing in front, look at the hips and see that neither is lower than the other ; also note this subsequently when standing behind the animal. Dropped hip is occasioned by the point of the hip having come in forcible contact with a door-post or gate. A piece of the ilium is chipped off, but the accident does not as a rule cause any inconvenience after the heat and pain have subsided. This injury is an eyesore or blemish, but is not often a permanent unsoundness.

Standing alternately on either side of the animal's head, we look at the outline of the hocks over the seat of spavin and note whether they are similar in appearance.

Injuries to the jaw.

Swollen glands.

Passing to the near side of the animal, examine the under part of the jaw and chin and notice if any injury exists from the curb or bit, feel the space under and between the jaw-bones for swollen glands, particularly for the small hard gland which in glanders becomes fixed to either side of the jaw-bone.

Ordinary swollen glands are often the result of a chill and they are often the symptom of a fever called "Strangles," which attacks young animals and which will be afterwards described.

Move back to the near shoulder and look at the withers.

See whether there are any fresh wounds or old scars and note whether the animal flinches from tenderness when the wither is touched or pressed. Reject an animal with tender withers if he is required for pack-work.

Wounds and scars.

You will now have to examine each of the forelegs, but you may have found by this time, especially if the animal is young, that he is inclined to resent your inspection, most probably because he is afraid of you.

Examining and handling the limbs of young animals.

As regards bullocks, it is as a rule not possible for a stranger to handle them without considerable danger of being horned or kicked. The bullock is particularly clever at kicking forward with the hind leg.

This is generally called a "Cow-kick" and is delivered with lightning speed.

When examining bullocks for injuries, etc., it is necessary to cast them.

On the whole, you will be wise to confine your examination of a bullock to what you can see, as he will not stand handling.

Young mules are also difficult to handle and are inclined to jump away from, or kick at, strangers. Make a rule of not allowing drivers to "cheep" at mules and ponies, by which I mean making a chirping noise which varies from the "cheep" of a sparrow to the call of a partridge.

This only excites the animals, and it is better to quiet them by soothing words or the purring noise used by an Irish groom when handling his horses. This sound is made by closing the lips and making them vibrate by blowing through them with some force.

A mule is generally more difficult to handle than a pony; so we will principally refer to the former animal on the question of safe handling. Riley in his first chapter tells us how to handle the mule.

He says: "In commencing to break the mule, take hold of him gently and talk to him kindly. Don't spring at him or from him as if he were a tiger you were in dread of; don't yell at him; don't jerk him; don't strike him with a club as is too often done; don't get excited at his jumping and kicking. Approach him and handle him the same as you would an animal already broken."

Method of handling the mule.

The above advice is very good, but difficult to carry into execution in its integrity when we have an animal which takes a 10-foot leap every time we go near him.

But still, Riley's is the proper spirit in which to approach your mule, and we will now mention some precautions to be observed when handling his legs.

When passing the hand down the fore legs, stand well behind them and close to his body; in this position you will be safe if he strikes at you.

Precautions necessary in examining a mule's leg.

When handling either of the hind legs, have the fore leg of the same side held up; this will prevent him kicking. When touching any part of the hind quarters, stand close to the animal and well in front of the hind legs.

Now to revert to the examination of the fore legs as to their soundness. As you pass your hand down the front and back of the leg, you should note any thickening or irregularity or any undue heat or difference in temperature between the two limbs.

Examination of the fore leg.

The following are the principal defects likely to present themselves :— Capped elbow, broken knee, splint, sprain or thickening of the back tendons or suspensory ligament, sesamoiditis, sprain of the fetlock joint, brushing, ring-bone, and sidebone.

Examination of the foot.

In examining the foot, look for signs of laminitis, corn, sandcrack, thrush, and contracted feet.

The above diseases may be described as follows :—

Capped elbow.

Capped elbow.—An effusion of serum (the fluid portion of the blood) into the tissues round the elbow.

Serum is a thick, yellowish or straw-coloured fluid somewhat thicker than water (Fitzwygram). Capped elbow is generally the result of irritation caused by the heel of the foreshoe when the animal is lying down. It seldom occurs in animals which have not been shod. In slight cases, shortening the shoe and preventing the animal from lying down for a few days will effect a remedy. If this does not succeed, it is necessary to employ absorbing agents, which will be mentioned in a subsequent lecture.

Broken knee.

Broken knee.—This term refers to the animal having a blemish on either or both of his knees caused by his having fallen and cut the skin. This is a serious blemish in a riding horse, but is not of much consequence in a transport animal, provided he is strong and does not trip badly.

Splint.

Splint is a bony deposit which generally occurs on the inside of the cannon bone. It is the result of inflammation caused by concussion. It occurs while the animal is young and is generally due to his having been worked hard at too early an age.

As a rule, splints only cause lameness while they are forming. They are of little significance in a transport animal unless they interfere with his action and he strikes the splint with his opposite foot when in motion, thereby causing irritation and lameness. This, however, nearly always happens at a fast pace and not at a walk, the pace of transport animals (see also Fitzwygram, Chap. XXXIX).

Sprains of Back Tendons and Suspensory Ligament.

Sprains of back tendons and suspensory ligament.

These are dealt with by Fitzwygram, Chapter XLIV. The different tendons of the leg are illustrated in the same chapter.

Tendons are either " flexors " or " extensors."

Flexor tendons.

The flexor tendons are those at the back of the leg. Their work is to raise and bend the leg when the animal is in motion.

Extensor tendons.

The extensors straighten and bring forward the limb after it has been raised by the action of the flexors.

In the hind leg there is one flexor in front to bend or flex the hock.

The tendons of the fore leg are fully illustrated in Plate XVI opposite page 475 of Fitzwygram.

These tendons are made of strong, tough fibres closely packed together.

A sprain consists in some of these fibres being ruptured, the result being inflammation, pain, lameness, and permanent thickening of the tendon if neglected.

Definition of a sprain.

The treatment of sprain will be spoken of in a subsequent lecture.

Sound tendons.

Sound tendons are hard, smooth, and fine to the touch when the animal's weight is rested on the limb.

Unsound tendons.

Unsound and sprained tendons are soft, thick and often have distinct lumps or thickenings on them.

Firing marks.

Firing marks on the limbs are proof that the animal has suffered from disease or sprain, and he should be rejected.

This does not however refer to distinguishing brands.

Sesamoiditis is an inflamed or ulcerated condition of the sesamoid bones situated above and behind the fetlock joints. Fitzwygram says that sesamoiditis is caused by the surrounding tendons being overtaxed and becoming inflamed, the sesamoid bones being involved in the inflammatory action. The result of this disease is a tense thickening round the sesamoid bones, and the animal generally evinces pain when it is pressed with the fingers. This disease when it occurs with pack animals shews that the animal's carrying powers have been greatly overtaxed and an animal so affected should be rejected.

Sesamoiditis.

Sprain of the Fetlock Joint.—This is caused by injury to the ligaments and tendons passing over and connecting the joint.

Sprain of the fetlock joint.

As a result of the inflammation caused by repeated sprains, the ligaments and tendons about the joint thicken over the sprained part and the joint looks distorted and presents a different appearance from the fetlock of the other leg.

This is a bad unsoundness in a young animal, but would not matter so much in an aged pack animal provided the joint is cool, and steady work does not produce lameness.

Brushing.—This term is used when the inside of the fetlock is struck by the opposite foot when the animal is in motion. In transport animals this is generally caused by weakness or want of condition.

Brushing.

The fetlock joint becomes swollen and tender from being frequently struck, and sometimes the skin is worn or cut. In these cases the real remedy will be found in good feeding and care, and brushing will disappear with increasing strength.

If the animal is shod, it should be noted whether any of the clenches of the nails project from the foot and thus cause the injury.

As a temporary measure the wounded fetlock may be protected by a leather covering.

Ringbone is a bony growth either on the upper or lower pastern bone and affecting either the upper pastern joint or the lower pastern joint round the coronet.

Ringbone.

In a pack animal it is the result of over-taxed strength. When the inflammation has subsided and the bony growth is fully formed, ringbone often does not affect an animal for draught or pack work.

This however depends on the position of the ringbone and to what extent it affects the pastern joints.

Ringbone must not be confused with a thickening of the skin caused by picketing shackles.

Sidebone.

Sidebone is a condition caused by the ossification of the lateral cartilages on each side of the foot just above the coronet. In a sound animal the cartilages are elastic and pliant to the touch.

As a result of over-taxed powers, inflammation is set up in these cartilages, and when this is continued for any length of time, they turn into bone which often causes lameness by pressing on the soft, tender structures of the foot.

Sidebones when once formed may or may not cause permanent lameness, and transport animals so affected can often do good work both in pack and draught. A young animal with sidebones should, however, be rejected as they may cause incurable lameness.

Construction of the foot.

(NOTE.—For the description of the following diseases of the foot, two dried feet are necessary—one carefully sawn through the middle from the toe to the heels, and the other sawn across the middle of the foot from side to side. The construction of the foot as detailed in Lecture XIV under "Shoeing" should be shortly described. For diseases of the foot see also Fitzwygram, Chapter LXV.

For illustrations of the structure of the foot, see Plate XXXVI opposite page 654 of Fitzwygram.)

Laminitis.

Laminitis is an inflamed and congested condition of the sensitive lamina or leaves, which form the inner surface of the wall and sole of the foot. When laminitis is present, there is great lameness, which is at once detected. When the animal has suffered from frequent attacks, evidence of this remains in well-defined rings which form round the outer surface of the foot.

The sole of the foot also falls and the ground surface becomes convex instead of concave. With the exception of the bullock, transport animals are not liable to this disease, the treatment of which will be dealt with under Diseases of the Bullock.

Corn.

Corn is a disease which fortunately does not often affect transport animals. The seat of corn is in the angle between the crust and bars, where its presence can be recognised by a reddened appearance of the sole.

It is the result of excessive pressure on the sole usually caused by short shoes, the ends of which press on the seat of corn.

Corns often cause considerable lameness.

Sandcrack.

Sandcrack is a crack in the crust of the wall growing down from the coronet.

When well treated, it is generally easily cured and is not very likely to recur.

The treatment, which requires professional aid, consists in preventing the spread of the fissure to such an extent as to expose the sensitive laminæ and in stimulating the coronet by a blister to promote a new growth of horn.

Thrush.

Thrush is a disease from which all animals are likely to suffer whose feet are not kept thoroughly clean.

It is dealt with in Lecture XIV under the head of "Shoeing."

Dirt causes irritation and inflammation of the sensitive frog, from which a thin, acrid smelling discharge issues through the cleft of the horny frog.

If not of long standing, it is generally easily cured and will not recur except from neglect of cleanliness and sanitary precautions.

Contracted feet.

Contracted feet, being generally the result of bad shoeing, have been dealt with under that head.

The Asiatic mule, pony, or donkey has naturally a small tough foot, and when examining them, due allowance must be made for this fact.

Examination of hind quarters.

In continuing our examination of the animal, we turn towards the hind legs, noting whether there are any sores or scars on the back or if he flinches when his loins are pressed. Have an assistant to hold up the near fore leg so that the animal cannot kick at you while you are on the near side.

Method of picking up a fore leg.

The following is an effective way of picking up and holding a fore leg.

Off fore.—Stand beside the fore leg with your face towards the hind leg, press the back tendons with the finger and thumb just below the knee and give the fore leg a forward push with your elbow.

This will make him lift his leg, and when he does so, catch hold of the foot with the left hand and then transfer it to the right hand ; the animal soon learns what is wanted, and will hold up his foot directly the leg is touched.

This is a much better system than the fuss which the untrained syce or driver makes when picking up a foot.

When holding up a front leg, the hand should only hold the hoof. If you hold the leg higher up, the animal gets a purchase and can free his leg by resting his weight on your arm ; he cannot do this if you only hold the end of the hoof.

In passing the hand down the hind leg, you may meet with the unsoundnesses already mentioned in the fore leg except capped elbow.

You may also find spavin, thorough pin, capped hock, and curb.

Notice any wounds just above the hock; they have probably been caused by kicks, and it is quite possible that the tibia may be fractured although the broken ends have not been displaced. An animal which has been kicked just above the hock, causing a wound, should be rested for a fortnight and not allowed to lie down.

Spavin.

Spavin.—By ordinary spavin is meant a bony deposit inside the hock joint which is liable to interfere with the action of the hock.

Fitzwygram's plate XI opposite page 427 shows the different bones of the hock joint.

A large spavin is easily detected by the eye owing to its causing the outline of the affected limb to differ from the other.

It is a serious unsoundness for a pack animal, but many work on with spavins without going lame.

Smaller spavins are detected by carefully handling and comparing both hocks.

Bog spavin and thorough pin.

Bog spavin and thorough pin are distensions of the bursæ of certain tendons connected with the hock joint.

They do not often occur among transport animals and are not of such a nature as to interfere with their utility.

However, we would reject a 3 or 4 year old animal with puffy, swollen hocks, as this would denote general weakness of the joint.

Capped hock.

Capped hock is an effusion of serum under the skin at the point of the hock caused by kicking or by bruises on a railway journey or on a sea voyage.

It is unsightly, but is of no consequence, and generally disappears when the cause of the irritation is removed. Of course a kicker who is constantly bruising his hocks will always have them capped.

Curb.

Curb is a lump at the back of the hock about 5 inches below the point.

It is caused by the rupture of a small ligament.

This generally occurs in jumping. Curb causes lameness until the inflammation has subsided. It is not a serious unsoundness for transport animals which move at a walk.

Examination of a bullock.

In examining a bullock's limbs for soundness, we must trust to the eye to guide us.

In the first instance we must carefully note whether the animal trots sound and turns without flinching.

When looking at the teeth, we should at the same time notice whether there are any wounds or scars on the palate, tongue or lips giving evidence of the animal having recently suffered from foot-and-mouth disease. If this disease was in its acute stage, the bullock would be lame from the pain of the ulcers which form between the claws of the foot.

Traces of foot-and-mouth disease.

Also note whether the eyes are clear and sound, and whether the horns are firm. Reject an animal with a loose pendant horn. This is often evidence of worm in the horn, which is a very troublesome disease.

Worm in the horn.

Look at the neck for galls or tumours caused by the yoke; a full and flabby condition of the skin at this point is of no consequence as long as there are no hard tumours attached to the skin or underneath its surface.

Firing marks on the shoulders, quarters, stifles and legs are evidence that the animal has suffered from disease in these parts, generally rheumatism or sprain. Sprain generally occurs about the fetlock joint or in the hips.

Firing marks.

Bone spavins often occur in pack and draught bullocks; they are generally well developed and are easily detected when the hocks are inspected and compared with each other.

Bone spavins.

Spavin generally causes a dragging action to the foot and fetlock of the affected limb, more or less pronounced according to the size and position of the spavin.

Before passing a bullock, we should put him into a laden cart with a good working bullock on hilly ground, and we can then see whether he is a good working animal.

LECTURE IX.

General Stable Management, Feeding and Conditioning of Remount Ponies, Mules and Bullocks.

NOTE.—For the illustration of this lecture the following articles are necessary :—

Mule Line Gear.

Head collar.
Watering bridle.
Feeding-bag.
Fore shackle chain.
Fore foot shackle.
Hind foot shackle.
Heel chain.
Jhool.
Iron pegs.
Canvas bucket.
Brush.
Currycomb.
Forage nets.
Sickle.
Iron hammer.
Line-rope.
Scissors.
Clippers.
Basket.
Broom.
Hoof-picker.

Bullock Line Gear.

Eye-fringe.
Nose-rope.
Head-rope.
Wooden peg.
Feeding cloth.
Wooden mallet.
Jhool.

We now come to the important question of getting our animals healthy and fit for hard work after they have been placed in our charge.

To do this satisfactorily we require—

(*a*) Constant and intelligent supervision.
(*b*) Cleanliness of standings and surroundings.
(*c*) Good grooming.
(*d*) Purity and sufficiency of daily water.
(*e*) Regular and judicious feeding regulated by the animal's state of health and digestive powers.

Mule and pony remounts.

The remount mule or pony of 4 years when bought in India is not as a rule in a satisfactory state of health.

He has generally been hard worked, and his feeding has been injudicious and scanty. His digestion is often more or less out of order, he is frequently very light in flesh, and his skin and coat do not present the appearance to be looked for in a thoroughly healthy animal. In this state he will certainly do good work in the hands of his native owner in times of peace, but he could not stand the strain and exposure of field service. We require something more than this.

Before he is ready for field service, we want to see him filled up, hard, and in full health and strength, capable of successfully standing the fatigues and trials of a campaign. Animals brought from across the seas present similar defects on landing, and we may take it for granted that we shall have to encounter and overcome the following disorders in many of our remount mules and ponies :—

Disorders common among remounts on first landing.

Debility.
Indigestion.
Irregularities of the teeth.
Disorders of the skin and coat.
Thrush.
Wounds and bruises received on sea voyages and railway journeys.

Remount bullocks.

Newly-bought Indian bullocks are as a rule free from these defects.

Their owners seem to understand their management better than that of mules and ponies ; but, although young working bullocks generally keep good condition, they are constantly going lame from one cause or another.

When looking at the scales of attendants allowed for transport animals, we must take into consideration that our establishments are limited, and that we cannot expect to attain to the degree of excellence which we usually find displayed in the stable management of an Artillery Battery.

Establishment.

At the same time we must do the best we can with the resources at our disposal, and it is to be hoped that Officers and Non-Commissioned Officers attending courses of transport training will receive practical demonstration of the fact that it is quite possible to have clean, tidy lines and healthy animals even when they and their attendants are hard worked.

To begin with, we want a healthy locality and a perfectly clean space for our animals.

Standings are generally made and kept in repair by Transport Establishments; they should be raised about a foot above the general ground level to secure dry lying for the animals. They are generally made of small stones and gravel with a good binding loam in it. This should be well consolidated with a roller or rammer.

Standings.

A standing for 50 animals should be about 70 yards long and have a 3-foot wall running in front of it. This prevents forage being blown about during the day-time and helps to shelter the animals from cold winds when they are lying down at night.

Dimensions of standings.

At stations where the rainfall is very small, troughs of mud and stone are made to hold bhoosa and hay. Expenses for purchase of stone and gravel for standings can be charged under para. 1832, A. R. I., Vol. V.

Expenses for purchase of stone and gravel.

The standings must be constantly repaired and kept smooth, so that the animals can obtain proper rest when lying down. Drains must be cut round the standings to carry off the surface water.

Slope of standings.

The standings should have a slight slope of about 1 in 50 from front to rear just sufficient for proper drainage.

If the slope is too great, an undue strain is thrown both on the animal's fore legs and hind quarters. In a covered stable, where drainage for rain water is not required, the upper third of the stall may be level, the rear part having a slope of 1 in 50.

About 4 feet frontage should be allowed for each pony, mule or bullock and about 10½ feet from front to hind peg.

In Depôt and Regimental Lines it is always best to have permanent pickets.

Young animals are constantly kicking and plunging, and serious accidents are frequently caused by the iron-picketing pegs flying out of the ground and injuring the animals.

Accidents from pegs flying.

Permanent pickets.

Permanent pickets can be made as follows :—

Take a piece of wood 20″ × 2½″ × 2″.

Attach an iron ring and staple 2 inches from the top end.

Take a smaller piece of wood 10″ × ⅝″ × ⅝″ and drive it through the first piece two inches from the bottom end. Have the whole peg tarred over. Dig a hole in the standing 16″ × 10″ × 6″.

Place the picketing peg in it, allowing the top end to which the ring is attached to project 4″ from the surface. Rings to be turned away from the animal's fore and hind feet. Fill up the space round the peg with small stones and gravel, which should be moistened and consolidated. You have now a permanent picket which will last for years and save accidents and wear and tear of iron pegs, which is a considerable item of expenditure.

The cost of this is very small. The necessary materials are always at hand in pieces of condemned carts and wood rejected by the Ordnance Department, which is charged for at firewood rates.

Materials for permanent pickets.

Old iron suitable for the rings and staples is always obtainable in a Transport Depôt, and the Transport Artificers can perform the necessary labour ; any small expense for purchase of wood or tar can be charged and recovered under para. 1832, A. R. I., Vol. V, Clauses 1, 2, 3 and 5.

The litter yard should be close to the mule and bullock lines, so that time will not be wasted in carrying away the sweepings from the standings. The litter should be removed daily from the litter yard by the contractor and should not be allowed to accumulate. In standing camps or on field service the litter should be burnt if it cannot be otherwise disposed of.

Litter yard.

When picketing mules and ponies with iron pegs, care must be taken to drive the pegs so that the heads point away from the animal. When thus driven, the pegs are secure in the ground and cannot easily be drawn.

Pegs must be securely driven.

Bullocks and donkeys do not give much trouble in the lines.

Bullocks sometimes horn and kick at each other, but they are not difficult to secure and do not draw their pegs.

Before proceeding to describe the necessary routine of stable work, we will note what stable necessaries are at our disposal.

These are detailed in Appendices 43 to 51, Vol. V, A. R. I.

Stable gear for mules nd ponies.

For draught and pack mules and ponies we are allowed for each animal—

1 Head collar.
1 Watering bridle.
1 Feeding bag.
1 Fore shackle chain.
1 Fore foot shackle.
1 Hind foot shackle.
1 Heel chain.
1 Jhool.
2 Iron pegs.

For every 3 pack or 2 draught animals—

1 Canvas bucket.
1 Brush.
1 Curry-comb.
1 Pair forage nets.
1 Sickle.

For every 25 animals or fraction of 25 animals—

1 Iron hammer.
1 Line rope for marking out lines.

For every 50 animals or fraction of 50 animals—

1 Pair scissors.
1 Clipper.

For every 25 animals or fraction of 25 animals, quarterly—

1 Basket.
1 Broom.

For every 100 animals—

2 Picks.
2 Shovels.

Hoof-pickers.

A hoof-picker for every 3 pack or 2 draught animals would seem to be a necessity, but the question of its supply is now under the consideration of the authorities.

For the present we supply drivers with rough hoof-pickers made in the workshops from old iron.

Line gear for bullocks.

For draught-bullocks we are allowed the following stable necessaries :—

1 Jhool.	Per bullock.
1 Eye-fringe.	
1 Nose rope.	
1 Head rope.	
1 Wooden peg.	
1 Feeding cloth.	Per pair of bullocks.
1 Brush.	
1 Curry-comb.	
1 Wooden mallet.	For every 25 animals.
1 Picketing rope.	
2 Buckets.	
1 Broom.	For every 25 animals or fraction of 25 animals quarterly.
1 Basket.	

Materials for feeding bags.

The feeding bags are made of goat's hair cloth called "chut," which is very strong and is easily kept clean by washing.

Nose bags.

The present pattern of nose bag is a good one and is so designed that the animal can move his muzzle in and out of the bag while he is feeding. This is a great benefit as a small stifling nose bag is a great discomfort to an animal. The present nose bag can also be kept filled with bhoosa (bruised straw) on service or on the march. This

prevents the bhoosa from being blown about. In putting on the feeding bag, pass the head piece of the bag through the off side D of the head collar from underneath, bring it over the poll, pass it through the near side D and secure to the loop on the bag, letting the bag hang just clear of the animal's muzzle. He can then eat his feed and breathe comfortably at the same time.

Chains.

Chains are used for tethering mules and ponies in preference to rope ; although rather brittle, they are easily repaired and very often ropes cannot be replaced on service when they are worn out. A hungry mule moreover will sometimes make a meal of a rope.

Jhools.

The jhool is made of " chut " and lined with a double thickness of blanket. In taking over jhools from contractors, be careful to see that this double blanketing has been inserted and that the work is strong and well finished, particularly the buckles, straps, and belly-band.

Iron pegs and shackles.

The iron pegs and foot shackles must be carefully finished in accordance with the sealed pattern.

The heads of the iron pegs must be worked out of the same piece of iron as the peg and not welded on. Evasion of this can be discovered by cutting through the head of the peg with a cold chisel.

Canvas bucket.

The canvas bucket is used for watering animals from wells on the march. Be careful to see that buckets tendered for supply are properly finished off in accordance with the sealed pattern.

Brushes.

Brushes are as a rule made of a mixture of animal bristles and vegetable fibre. A serviceable brush should, as in the sealed pattern, have a good proportion of bristles in it. Vegetable fibres can be distinguished from bristles by the fact that they burn away to a white ash, while a burnt hair or bristle frizzles and emits a pungent smell. Brushes made entirely of bristles would be too expensive for general use. The bristles of a brush should be carefully secured with wire to prevent their coming out.

To satisfy ourselves on this head, we can unscrew the back of the brush and raise it with a chisel when the fastenings of the bristles will be exposed to view.

Curry-comb.

The present pattern of curry-comb has been facetiously called the musical curry-comb from the fact of its having jingling rings on it. It is the pattern used in Persia where they have no brushes and clean their mules and horses with the curry-comb. The jingling of the rings is supposed to keep the animals quiet. It is cumbrous, frail, and easily broken and a smaller and stronger pattern would seem to be desirable.

Forage nets and sickles.

The forage nets and sickles are supplied so that grass and bhoosa can be carried on the march if necessary, and opportunities taken for cutting forage on field service.

Iron hammer.

The iron hammer is supplied for driving pegs ; the present pattern is frail about the handle and neck.

Scissors.

The scissors should be curved, as these are more handy for cutting manes.

Stable Management.

Clark's clippers. Clark's clippers are the most suitable and are generally used; a piece of numnah should always be tied over the teeth of the clippers to protect them when not in use.

In order to carry out the routine of a large depôt satisfactorily, a good system is necessary. Every one should thoroughly understand what his work is and what is expected of him.

Necessity for a good system of routine.

The chain of responsibility from the Transport Officer to the driver cannot be maintained in tact unless all supervisors and petty officers perform their share of the work in a satisfactory and conscientious manner. These remarks are equally applicable to regimental transport.

In view to establishing a satisfactory system, Depôt Standing Orders have been published in Poona which assign duties and fix responsibility on different individuals.

Depôt Standing Orders.

To begin with, a Depôt or Regimental Transport Officer should attend his lines during stable hours every morning whenever possible (Thursdays and Sundays excepted). During the stable hours he should go round the mule and bullock lines and visit the workshops and sick stables. After the animals are fed, any reports can be made to the officer, and this is a good time to dispose of complaints against petty officers and drivers.

Duties of a Transport Officer.

Under orders from the Commissary General of the Bombay Army, uniform is always worn by Officers and Warrant and Non-Commissioned Officers when on duty in the Transport Lines.

All Warrant and Non-Commissioned Officers attend morning and evening stables, except on Thursdays and Sundays and other general holidays, when the attendance of the Orderly Sergeant only is required.

The following orderlies are detailed weekly from the permanent establishment when they are available. During the marching season, when the animals are away, these duties are cut down as may be found necessary.

Weekly Orderlies from permanent establishment.

Orderly Warrant or Non-Commissioned Officer.
,, Agent.
,, Jemadar.
,, Duffadar.
,, Gate Duffadars.
,, Sirdar of Bearers.
,, Mate of Bearers.

One Orderly Artificer with a hammerman or bellowsman as assistant.

So many Orderlies would at first sight appear unnecessary, but it must be explained that in large stations the transport work is heavy, and unless responsible Orderlies are detailed to distribute and inspect transport going to work, mistakes will occur and the drivers become careless in saddling and harnessing their animals. Special care is also necessary to prevent infringement of Cantonment rules regarding careless driving and the carrying of lights by vehicles after dark, and constant supervision of the drivers is required in these matters. Moreover where a transport depôt is situated, as is often the case,

close to a populous bazaar, we should be subject to the depredations of thieves by day and night if orderlies and sentries were not constantly on the alert.

Provision is also made for the practical training of Transport Agents in the management of animals, so that they may be able to take charge of them on the march if required to do so.

Practical training of Agents.

A very important duty which the orderlies have to perform is that of seeing to the watering, grooming and feeding of animals which may be away at work during the regular stable hours; without this extra supervision, animals returning at various hours would certainly be neglected.

Stress is laid on lines being visited by night, as it is important that sentries should be alert to see that their animals remain properly secured and jhooled; they should note any animals which cough during the night or show other signs of sickness, reporting the same to their Troop Jemadar.

Night guards.

The ordinary daily routine is described as follows in the Depôt Standing Orders :—

The hours named for winter and summer respectively are those which are suitable to the Poona climate.

In other stations subject to extremes of cold and heat, the hours would have to be altered to suit the seasons of the year.

From the 1st March to 31st October.

I. 5-30 A.M.—All petty officers and drivers to turn into stables under the Orderly Jemadar. Lines to be swept up, bedding to be placed behind the mules and litter thrown in litter yard; care to be taken that no grass is removed which could be used for bedding. No cow-keepers or their women are ever to be allowed inside the mule or bullock lines or near the litter-pit.

Daily routine.

II. Exercise any animals not required for work during the day; also those sick animals which require exercise.

Exercise.

III. 6-30 A.M.—Remove jhools, fold them neatly behind the animals, pick out feet and begin grooming. Animals are to be groomed with the brush, and not with the curry-comb.

Grooming.

N.B.—If it is raining heavily at this time, do not remove jhools, but wait until the sun comes out, when the jhools should be taken off and dried and the animals groomed.

IV. 7-30 A.M.—Water—Animals segregated under para. 2012, A. R. I., Vol. V, should be watered separately from tubs, and not from the general trough.

Watering.

V. 7-45 A.M.—Clean head collars and foot shackles. Soft soap to be lathered up in a bucket and applied; when dry, the soap to be rubbed in with a cloth. Head collars to be taken to pieces for cleaning.

VI. 8. A.M.—Feed, after which five drivers per troop will go to the hay-stacks to tie up and take away the daily ration of hay for their troops.

Feeding.

Put some hay down for animals—a little for those going to work, and more for those not going out.

VII. 8-30 A.M.—Saddle up and send animals to work as required.

[*N.B.*—The long distances which the animals have to traverse for the various station duties at Poona and Kirkee generally necessitate five or six hours' absence from the lines, and it is thought better to groom, water and feed them before they leave for work. It is only during the months of April and May that the sun is hot, and experience shows that on the level and shady roads of Poona and Kirkee working in the sun at a walk does not materially affect the condition of mules and bullocks.]

VIII. 12 NOON.—Water all animals in the lines and put down some hay.

IX. 3-30 P.M.—Water all animals present in the lines.

X. 4 to 5 P.M.—Grooming.

XI. 5 P.M.—Feed.

XII. 5-30 P.M.—Bed down and give hay for the night.

XIII. 6 P.M.—Jhool up all animals.

N.B.—During the hot weather it must be left to individual discretion as to whether it is advisable to jhool the animals at night. In the Deccan and Central India they are, as a rule, jhooled at night throughout the year, but during the warm evenings, from the 15th March to the burst of the monsoon, animals are not jhooled till 9 P.M In these climates, during the damp bleak months from June to September, animals are always kept jhooled while rain is falling. This precaution helps to keep them in condition. Jhools should be removed and dried whenever the rain ceases.

Jhools necessary during the rains.

From 1st November to 28th February.

XIV. Morning hours will be three quarters of an hour later ; other hours, the same as for summer months.

With reference to the routine laid down, we must be particularly careful to prevent cow-keepers, in collusion with the drivers, from taking away forage in the early morning. All hay or kurbee which the animals do not eat owing to its being soiled should be kept for bedding, which, however thin it may be when spread under the animal, always helps to keep him warm and comfortable at night and prevents him from being plastered with mud when the standings are softened by rain or urine.

As a rule the transport animals of a depôt are fully worked, but whenever there is a slack season, they must be regularly exercised when not required for work during the day.

Exercise necessary when not in regular work.

This is necessary for their health and prevents their plunging and kicking at the standings. Freshness is due to the instinctive feeling of a well-fed healthy animal that he must do something to expend the energy which has been derived from the food absorbed.

The feet of mules and ponies must be carefully cleaned out twice daily. If this is not done, they are liable to contract "Thrush." The feet of bullocks must be kept clean between the claws ; if this is neglected, sores will appear

Care of feet.

It is absolutely necessary that a well-fed animal in full work should be well groomed.

Grooming.

Grooming stimulates the skin to throw off waste materials and impurities through its pores. When an animal is at graze and doing no work, he does not require grooming. His food is cooling, and not being highly nutricious, his body can assimilate all the substances which are not worked off by the kidneys and intestines. In a well-fed animal however it is most necessary that the skin should do its share of the work in removing impurities from the body, and good grooming, by clearing the skin of scurf and opening its pores, encourages and helps it to perform this important duty. Grooming also has an invigorating effect on the system and improves the coat by stimulating the glands which nourish the hair. With only one man to groom three mules, and generally rather less than an hour to do it in, we must dispense with hand-rubbing and rely on the use of the brush for removing scurf and stimulating the skin.

Animals should be groomed with the brush, and not with the curry-comb, which would tear and break the hair. The curry-comb is used to clean the brush. When grooming, the driver should be made to stand well away from his animal. This obliges him to groom with a straight arm and bear weight on his brush.

Three strokes on the skin with the brush to one application of the brush to the curry-comb is the right proportion.

This practice is reversed unless the drivers are watched, and the result is that they evade about half the labour of grooming and inflict unnecessary wear and tear to the brush by incessant friction with the curry-comb.

When grooming on the off side, the brush is held in the right hand and the curry-comb in the left, and *vice versa* when grooming on the near side.

Advantages of clipping.

Animals with long coats take a long time to groom, and this is one of the reasons why we clip our mules. Clipping is also of great use in enabling the skin to be kept thoroughly clean and in good working order by the use of the brush.

A long coat is oppressive to an animal working in a hot sun, and he is liable to chills from standing about in a cold breeze when his coat is saturated with sweat. In a moderately dry climate the sweat dries off a clipped animal nearly as quickly as it comes through the skin. In districts subject to the cold breezes of the south-west monsoon, the winter coat comes on well by October, and all mules are clipped during that month. The legs are left unclipped from the fore arms and gaskins downwards for two reasons : 1st, in clipping the legs, the machines are constantly broken from the animal's kicking ; 2nd, the long hair keeps the legs warm at night, when the animals are on the march during the winter months.

The coats of many mules grow long again after the first clipping, and these are reclipped in December. The coats are well set by Christmas-time and do not grow after the end of December. The summer coat comes on again during the month of April.

Indian bullocks do not require clipping. The clipping of camels will be dealt with under the diseases of that animal, as he is clipped with the special object of preventing skin-disease.

The ordinary pack mule is a small animal, and when his coat is kept short, a driver can give him a fairly good grooming in fifteen or twenty minutes if he is kept to his work. The draught mules are somewhat larger animals, but two of these when clipped can be well groomed within the hour.

A pair of draught bullocks can also be well groomed in the same time. Drivers should not be allowed to wear their uniform when at stable duties, as their clothes get quickly soiled and worn out.

Manes are kept hogged.

In order to still further lighten the labour of the drivers and keep the animals clean, the manes of mules, ponies, and donkeys are kept hogged. This prevents the accumulation of scurf and dirt and also assists in the removal of the same.

Tails squared.

Tails are kept squared to prevent their becoming matted and tangled from dirt and wet and also in order to allow the brush to pass freely through while the tail is being groomed. It also gives an appearance of uniformity to the animals. Tails should not be squared higher than the middle of the hock, as with short tails animals cannot flick away flies.

Pure water.

A pure water-supply has undoubtedly an excellent effect on the health and condition of all transport animals, and this is a point about which we should be particular ; although animals often drink dirty water without any immediate bad effects, it must be evident to any sensible person that the absorption of dirt into the system is injurious to health. Bad water is a fertile source of infection with the eggs of parasites.

Care in watering.

When watering animals, be careful to see that each one gets as much as he wants to drink. Mules and ponies when brought to the drinking trough in three's often disturb each other when drinking, and shy animals should be watered separately. Mules are inclined to be particular about their water and often will not drink unless it is clear and good.

Always water before and not after feeding. In cold weather animals will not as a rule drink until the sun has taken some of the chill off the water, or the higher temperature of the day has warmed their bodies.

After watering, the head collars and foot shackles should be cleaned. Head collars as issued by the Ordnance Department are generally much too big for mules and ponies. After receipt of them, they should be fitted to the animals.

Fitting head collars.

When fitting a head collar to a mule or pony, remember that the nose band should be two fingers' breadth below the cheek-bone and should admit the breath of two fingers beween it and the nose ; the throat lash when fastened should admit of two fingers being inserted between it and the throat. All ends of straps should be fixed into their runners.

The following table gives suitable dimensions of head collars for mules or ponies according to their size :—

Size of head collars.	Height of mule or pony.	Head piece sewn on off side.	Cheek piece on near side including buckle.	Nose band.	Jowl pieces, each.	Coupling piece.	Throat lash.	Brow band.
	Hds. in.							
I ...	12 2	31″	7″	12½″	4½″	4½″	39″	16½″
II ...	13 0	33″	7½″	13″	5″	5″	42″	17″
III ...	13 2	35″	8″	15″	5½″	5½″	46″	17½″

Cleaning head collars.

Head collars should be taken to pieces and cleaned every morning. Foot shackles should also be cleaned daily, or they become hard and foul. The general care of leather work will be dealt with in a subsequent lecture.

Eye-fringes.

The eye-fringe protects the animals' eyes from hot winds and the glare of the sun. They should be kept on in stables during the day and also when the animals are at work in the sun.

When mules and ponies are equipped with fore and hind foot picketing gear, it is generally found advisable to remove the head collars and eye-fringes at night. This is a change for the animals and prevents losses, as, in the event of their breaking away at night, their head collars are often stolen.

Care and repair of jhools.

It is particularly necessary to see that the jhools are in good repair, especially as regards the breast straps and belly bands. If a newly-clipped animal loses his jhool on a cold night, he is very liable to catch a severe cold. Except in a very hot moist climate, it is best to keep animals jhooled while rain is falling, as they lose condition from standing in the rain without protection. Whenever the rain ceases, the jhools can be removed and dried.

Native owners in India always provide cover for working animals in rainy weather.

The horses of native cavalry and the mules, ponies, and bullocks of the Government Transport are the only working animals that have to face exposure in all weathers, and consequently we must take precautions against chills.

Supply of sand for standings.

A supply of dry sand should be kept close to each line of animals. By sprinkling this on the standings they are kept clean and dry. Litter must never be allowed to accumulate, but must be removed at once to the litter yard.

The walls of the standings, if not built with lime, should be kept well plastered, or they will fall down if the rain is allowed to soak into them. When

animals come in hot from work, they should not be fastened up at once, but should be walked about for ten minutes to cool them. Mules or ponies will move round steadily in a circle if they are fastened one behind the other and the head chain of the leading mule secured to the saddle of the last animal.

The following paragraphs of Section IV of the Poona Depôt Standing Orders provide for the reception and issue of the grain and fodder rations together with the precautions adopted to prevent pilfering so as to ensure each animal getting its full allowance of food.

Issue of grain and fodder ration.

They also deal with the preparation of the grain so as to make it thoroughly digestible before it is issued to the animals.

"Para. 5. The daily ration of grain will be weighed by the Orderly Warrant "or Non-Commissioned Officer at 8-30 a.m. Directly after "weighing, it is crushed and locked up in the grain room, "the Orderly Warrant or Non-Commissioned Officer "keeping the key.

Rations weighed by Orderly Warrant or Non-Commissioned Officer.

"At 4 p. m. the Orderly Warrant or Non-Commissioned Officer will issue "sufficient grain for the evening feed, again locking the grain room.

"At 6-30 a. m. (7 a. m. winter months) he will issue the balance for the "morning's feed and will then see that no grain remains in the grain room, the "next supply not being drawn till 8-30 a. m.

"The grain must be thoroughly crushed, and not merely split.

"The Orderly Warrant or Non-Commissioned Officer must see to this, or "the drivers will evade it by opening out the rollers of "the crusher.

Supervision of grain-crushing necessary.

"Para. 6. One half pound of grain will be short drawn from each ration, its "equivalent in value of bran being drawn from the Government bakery and "weighed stored, and issued at the same hours and in "the same manner as the grain. The usual proportion "is ten ounces of bran in lieu of eight ounces of grain.

Proportion of bran in lieu of grain.

"Para. 7. The ration of salt is to be carefully distri- "buted after the feeds are weighed out.

Salt.

"Para. 8. All mule and bullock feeds are to be laid out on the flank of the "mule lines during stable hours, and the Orderly Daffa- "dar will be present with scales and weights to enable "officers to test the weight of feeds.

Laying out feeds.

"Para. 9. Before putting on nose bags, and after the Transport Officer has in- "spected the feeds, a double handful of damp chaff will be "mixed through each feed. To save wear and tear of nose "bags, condemned hospital steel basins can be used for mule and bullock feeds "in Cantonments. With a little mending they answer the purpose very well.

Chaff with feeds.

"Mules and bullocks should, however, always have their nose bags and feeding "cloths on the march. Feeding bags and cloths must always be kept clean.

"Para. 10. The Storekeeper will, under the orders of the Warrant Officer in "charge of the Lines, draw in advance a reserve of two "hundred pounds of grain to meet emergencies and for "feed of animals hurriedly despatched to out-stations.

Advance of grain.

This reserve is to be crushed and stored in a separate store-room and "is to be kept entirely separate from the daily ration kept in the grain "room.

"Para. 11. The reserve grain is never to be brought to the grain room, but, "if required, it is to be issued direct from the Store-room."

Change of food.

Transport Officers are, under paras. 1923—24, A. R. I., Vol. I, allowed to change the food of their animals when this is considered necessary. It must be noted, however, that no extra expense must be incurred without the sanction of the Chief Commissariat Officer, and that, if more expensive food is given, a proportionate reduction must be made in its quantity.

Ryland (pages 25—29) gives some useful hints on stable management.

LECTURE X.

Veterinary Supervision of Transport Animals, Signs of Health and Sickness in Transport Animals.

Appliances and Medicines.

NOTE.—For illustration of this lecture the following are required :—

Out-door Illustrations.

Two or three quiet camels, mules and bullocks for feeling the pulse, taking temperature, giving a ball and drench and administering an enema.

A mule or horse suffering from derangement of the liver, and a debilitated ænemic nimal or examination of mucous membranes.

A mule or pony with a staring coat, and one with a soft glossy coat.

Clinical thermometer.

Linseed meal and gentian balls.

Drenching bottle.

Bandages, linen and woollen.

Some tow, a piece of numbda, and a blanket.

Hot water for illustrating fomentations.

Slings.

Poultice boot.

Enema funnel.

Tooth rasp and balling iron.

Casting hobbles with 4 pegs, rope and side lines.

Casting rope and collar.

Long-rope twitch, ordinary twitch.

Short pole, smoothed and ends rounded.

In-door Illustrations.

Scales and weights for medicines.
Fluid measures.
Probe.
Forceps, small.
Curved scissors, small.
Syringe.
Catheter.
Scalpels and lancet.
Suture needles ; silk and wire for sutures.
Cotton wool.
Pestle and mortar.
Spatula.
Samples of—
Linseed.
„ oil.
Bran.
Sulphate of magnesia.
Sulphur (sublimate).
Ghee.
Aloes.
Calomel.
Ginger (root and powder).
Nitre (nitrate of potash).
Nitric ether.
Aromatic spirits of ammonia.
Assafœtida.
Camphor.
Chiretta (fagot and powdered).

Samples of—
Gentian (root and powder).
Sulphate of iron.
Arsenic (Fowler's Solution).
Common salt.
Carbolic acid.
„ lotion.
„ oil.
Perchloride of mercury.
„ „ lotion.
Phenyle.
Macdougall's powder.
Opium.
Catechu.
Chalk.
Goor.
Sweet oil.
Mustard oil.
Mustard.
Alum.
Sulphate of zinc.
Acetate of lead.
Sulphate of copper.
Nitrate of silver.
Turpentine.
Iodine.
Tincture of iodine.
Biniodide of mercury.

Veterinary supervision.

All transport animals, depôt and regimental, are under the veterinary supervision of the Veterinary Surgeon in charge of the Station Veterinary Hospital, who inspects the animals once a month or oftener if necessary.

The treatment of ordinary ailments is, however, left to the Transport Officer and his assistants, and it is therefore necessary that we should obtain some useful knowledge on this point.

Symptoms of health and sickness.

We have the following guides to help us in determining the state of an animal's health :—

1. The internal temperature of the body.
2. The beat of the pulse.
3. The respiration or breathing.
4. The state of the appetite.
5. The appearance of the mucous membrane.
6. The appearance of the eye.
7. The condition of the skin and hair.
8. The appearance of the excreta.

Temperature of the body.

The internal temperature of the body is a safe guide. A rise in temperature denotes febrile disturbance, while a fall below the normal heat points to weakness and impaired vital powers. Observation has proved that an approximately accurate standard of normal temperature can be determined.

Normal temperature.

It will be sufficient for our purpose to say that the normal temperature of a healthy animal in regular work is 100° Fahrenheit for the elephant, camel, mule, pony, and donkey and 101° for bullocks. These temperatures are, however, subject to a variation, consistent with perfect health, of one degree either way.

This is especially noticeable when the days are hot and the nights cold. The temperature of a perfectly healthy animal is, under these circumstances, often two degrees higher in the afternoon than it was in the morning.

Clinical thermometer.

The instrument used for taking internal temperature is the clinical thermometer, which is self-registering, a break in the column of mercury causing the upper portion of the column to remain stationary at the indicated internal temperature, until the mercury is driven down by jerking the instrument. The rectum is the best seat for taking the temperature.

Method of using thermometer.

The thermometer should first be brought somewhere near the expected reading by holding the bulb in the closed hand; it should then be oiled and carefully inserted into the rectum and held there for 3 minutes.

If the animal is frightened, have a foreleg held up.

On removal, the correct reading of the temperature will be found registered.

Temperature in fever.

During febrile diseases the temperature generally ranges between 100° and 106°.

Precautions necessary in handling mules and ponies.

Remember when handling a mule or pony's tail or hind quarters, or in adjusting a crupper or breeching, always stand in front of the hind leg and close to the animal.

If you have no thermometer, the temperature can also be roughly gauged by placing the finger on the animal's tongue, which in health would be cool and moist, and in fever would feel dry and hot.

Pulse.

The pulse indicates the strength and regularity or otherwise of the heart's action, and, by its description and frequency, is a guide to an animal's state of health, except in the bullock and camel, in which animals the pulse is greatly excited and quickened during rumination, and this might lead the inexperienced to think that something was amiss with animals really in perfect health.

In the mule, pony, and donkey the pulse is generally felt by pressing the middle finger of the right hand on the artery which passes round the bottom of each branch of the lower jaw. This requires a little practice at first. In close proximity to the artery lies the salivary duct.

Normal pulse of mule, pony, and donkey.

In these animals the normal pulse beats about 40 times a minute ; it is more frequent in a young animal.

It increases with violent exertion.

In an animal standing quietly, anything over 50 beats denotes constitutional disturbance, such as fever or pain.

A bullock's pulse is also felt at the lower jaw.

Normal pulse of the bullock.

Forty to forty-six may be taken as normal, but, as before stated, the pulsation of a healthy bullock is subject to great variation.

Pulse of a camel.

The normal pulse of a camel is about 50.

General description of pulse.

In the healthy animal the pulse is strong, full, and regular, and there is a certain amount of resistance to the finger afforded by the contraction of the artery.

In disease the variation of the pulse is considerable both as regards the rapidity of the flow of blood and the resisting power of the artery.

Respiration.

The respiration or breathing is performed about 14 times per minute in the healthy pony, mule, bullock or donkey. Exertion, of course, quickens the breathing, and the normal rate varies slightly in individual animals.

Peculiarities of breathing.

Any great increase in the rate of breathing denotes some constitutional disturbance, but our attention should be specially drawn to any peculiarity of the breathing, such as panting or heaving. Jerky, spasmodic breathing generally denotes asthma or broken wind.

Appetite.

The appetite of an animal is a good indication of his health. A strong healthy animal is nearly always a big feeder; the sick and weakly ones are dainty.

Refusal to eat after a hard day's work shows that the animal has been overdone and requires rest.

The mucous membrane lines those inner parts of the body which have direct communication with the external air—*e.g.*, from the nose to the smallest divisions of the lungs, again from the mouth to the anus, from the penis to the bladder, or from the vagina to the bladder.

Mucous membrane.

It is furnished with blood vessels and nerves.

In health it has a delicate pink colour.

In a debilitated animal it is pale, in fever and inflammation it becomes red, in derangement of the liver it has a yellowish tinge.

The mucous membrane of the eye and nostril, being thin and delicate, exhibit these changes of colour in a marked degree.

The eye looks bright and clear in health. In sickness its appearance is dull.

The eye.

The skin is furnished with pores which help to carry off waste matter and impurities of the blood, after the required amount has been used for the nourishment of the body. In a similiar way, excess matter and impurities, in the form of urine and fæces, are carried off by the kidneys and intestines.

The skin.

When an animal is well fed, the proper action of the skin becomes a necessity.

A healthy skin is loose and soft, clean and free from scales or scurf.

Underneath the skin there are two sets of glands.

Glands of the skin.

The sweat glands secrete perspiration which is discharged through the pores of the skin, and the oil glands secrete an oily substance which is discharged through the skin and partly into the roots of the hair.

The better an animal is fed and the harder he is worked, the more copious are these secretions ; hence the necessity for a thoroughly clean skin to carry them off.

The hair is nourished by the skin and depends on it for its health. A healthy skin produces a smooth glossy coat irrespective of its length or thickness, while if the skin is unhealthy, the hair is rough, dry, and staring.

The coat.

The appearance of the excreta of an animal also gives evidence as to his state of health.

Excreta.

The fæces of different classes of animals differ in consistency and colour.

In the elephant, pony, mule, donkey, and camel the contractions of the muscles of the intestines cause the dung to form into balls.

In the bullock it is evacuated in a soft state.

The colour varies according to the forage eaten by the animal. The droppings of a pony are, as a rule, lighter coloured and softer than those of the mule, camel or donkey.

Unhealthy fæces have an offensive odour ; if they are clay-coloured, derangement of the liver is indicated.

Disordered liver.

The frequent evacuation of watery fæces constitutes diarrhœa.

Diarrhœa.

The appearance of slime or blood in the droppings points to irritation of the intestines, and the presence of grain shows that the food is not being properly assimilated.

Healthy urine in the elephant, pony, camel and bullock is thin and amber-coloured. That of the mule and donkey is much thicker and has a yellowish tinge. There seems to be no reason for this, and we may say that it is an inherent peculiarity. Similarly each animal in the zoological scale has its characteristic odour. Unhealthy urine is generally thick or dark coloured and the odour is offensive.

Appearance of healthy urine.

Before dealing with the treatment of simple diseases, it is necessary to describe some of the appliances and medicines commonly used.

Table of weights and measures.

The following table of weights should be learnt :—

AVOIRDUPOIS.

Used for weighing grain, fodder, stores, forage, etc.—

16 grains= 1 oz.
16 ounces= 1 lb.
14 pounds=1 stone.
28 pounds=1 quarter.
4 qrs. or 112 lbs=1 cwt.
20 cwt=1 ton.

APOTHECARIES' WEIGHT.

Used for medicines—

20 grains=1 scruple.
3 scruples or 60 grains=1 drachm.
8 drachms=1 ounce.
12 ounces=1 lb.

FLUID MEASURE.

For medicines—

60 minims=1 fluid drachm.*
8 fluid drachms=1 fluid ounce.
20 fluid ounces=1 pint.
2 pints=1 quart (1 seer Indian measure).
4 quarts=1 gallon.

Indian measure used for transport loads.

32 oz. or 2 lbs.=1 seer.
80 lbs or 40 seers=1 maund.

Commissariat stores for service are, as far as possible, made into one-maund packages.

A sick animal requires constant attention to his wants and needs and should be made as comfortable as circumstances permit. The means at our disposal of course vary, but wherever situated we should as far as possible be guided by the following rules :—

Care and requirements of sick animals.

(*a*). A cool, well ventilated, loose box is the first essential, failing which we should have a clean shed, or temporary shelter from the sun and rain or the shade of a tree.

(*b*). Sick animals should be kept out of direct draught. When the weather is very hot, steamy, and oppressive, a cool breeze will refresh them, but they should be protected from chill by a light rug on the body.

* The fluid drachm must not be confused with the dram or tot used in measuring rum, which contains four fluid ounces.

(*c*). A quiet situation is necessary ; noises and shouting should not be allowed in sick stables.

(*d*). The loose box or shed or standing should be kept perfectly clean and dry. Disinfectants should be used as required. Never allow droppings to be placed in the corner of the stall, but have them removed at once.

Cleanliness necessary in sick stables.

(*e*). The body and legs must be kept warm by rugs and bandages. The temperature of the air must be considered and care taken that the clothing is not oppressive.

Jhools for use in sick lines.

For sick lines there should be several jhools of different weights and thickness to meet variations of temperature at different seasons of the year.

These and also bedding and bandages can be obtained under para. 1832, Vol. V, A. R. I.

Bandages for mules, ponies, and bullocks should be about 7 feet long and 3½ inches broad. Several pairs of linen and woollen bandages are required for sick stables.

Bandages.

A bandage should be rolled up before it is applied. It should be taken off twice daily and the animal's legs rubbed.

The following are the methods of using bandages :—

Warm bandages for keeping the legs warm should be put on loosely. Begin about the middle of the cannon bone and wind it downwards over the fetlock joint to the bottom of the pastern, then wind it upwards and secure under the knee.

Use of warm bandages.

Cold bandages for cooling a leg inflamed below the knee or hock should be made of linen and folded similarly to the warm bandage, but a little tighter. They should be kept constantly wet with water or, if available, a cooling lotion as follows :—

Cold bandages.

Cooling lotion.

Sulphate of zinc	2 drams of each.
Acetate of lead	
Water	1 pint.

A sweating bandage for reducing bruises and swellings is the same as a cold bandage. After it has been well wetted, it is covered with a piece of oil-skin.

Sweating bandage.

A fomenting bandage for soothing pain and reducing heat is applied by soaking a woollen bandage in hot water. It is then squeezed dry, rolled quickly on the limb and a dry woollen bandage applied over it.

Fomenting bandage.

Supporting bandage.—When an animal from fracture or severe sprain cannot rest his weight on a limb, the other leg must be supported below the knee or hock. If this is not done, the sound leg will in time become diseased owing to the increased strain which it has to bear.

Supporting bandage.

To support a limb, first apply round it a liberal supply of tow and then fasten the bandage on tightly, beginning and finishing below the knee as described for a simple warm bandage.

Special bandages are required for the knee and hock.

Drinking water to be changed twice daily.

Whenever possible, water should always be within reach of a sick animal. It should be changed twice a day as it absorbs the gases thrown off from the floor of the stable.

Clean bedding.

Plenty of clean bedding is also a necessity for a sick animal.

Points to be observed in fever cases.

In febrile diseases the following points should be frequently noticed :—

Temperature (twice daily).

Respiration.

Colour of mucous membranes.

Warmth or otherwise of legs and body.

Fomentations.

Fomentations are used for reducing pain, heat or swelling in any part of the body.

To apply a fomentation, dip a piece of numbda or blanketing in hot water, wring it out and apply to the part required, placing over it some thick woollen material in order to retain the heat.

The fomentation should not be hotter than the hand can bear. This should be continued for an hour at a time.

Wooden bucket for fomenting below the knee.

For fomenting a leg below the knee or hock a long wooden bucket is also useful.

The leg is placed in it and warm water is added as required.

Poultices.

Poultices soften, relax, and soothe the parts to which they are applied. They are useful for bringing abscesses to a head, cleansing inflamed wounds or reducing heat in the feet. Poultices are generally made of bran and hot water. Linseed and bread are also used.

For the feet, a poultice boot is used.

Enema funnel.

The *enema funnel* is used to discharge fluids into the rectum in order to soften and loosen hardened fæces and induce the lower bowel to evacuate its contents. Enemas are very useful in cases of constipation or colic. Warm water with soap in it is generally used.

Tooth rasp.

The use of the tooth rasp was previously explained when discussing irregularities of the teeth.

Whenever an animal is out of condition, always look at his teeth and, if necessary, have them attended to.

The probe.

The *probe* is used for searching wounds and ascertaining their extent; also for feeling any foreign matter in a wound or pieces of bone in the case of a fracture, but very great care must be exercised in using the probe, particularly when the injury is in the vicinity of a joint.

The forceps.

The *forceps* are used for extracting foreign matter or pieces of bone from wounds.

Curved scissors.

The *curved scissors* are necessary for removing the hair from the sides of a wound, also for cutting off pieces of dead skin.

Syringe.

The *syringe* is used for washing out wounds.

Knives.

There are several kinds of knives used for veterinary work. Their ordinary use is for opening abscesses.

Suture.

By a *suture* is meant the insertion of a wire or thread to bring together the edges of a cut or torn wound to induce them to join.

A curved needle is used with silk stitches in a small wound, or wire stitches in a large one.

Cotton wool and tow.

Cotton wool and tow are used for covering wounds so as to keep the air away.

Scales and weights.

Scales and weights are necessary for weighing out solid medicines, and measures for fluids. The pestle and mortar is used for grinding and mixing medicines, and the spatula for dealing them out, the preparation of ointments, spreading poultices, etc.

Slings.

Slings are very useful when an animal is so injured as to prevent his lying down or when it would be unsafe to allow him to lie down. The slings should be adjusted so that they will lightly touch the belly, and the animal will soon learn to avail himself of the support when he is tired. Slings, if drawn tight, would interfere with the breathing and digestion and produce sores from friction.

Casting sometimes necessary for diagnosis.

It is often necessary to cast an animal in order to ascertain the extent of injuries or perform operations to which he would not submit if free from restraint.

When casting an animal, we should provide a thick, soft, bed for him to fall on.

Old animals sometimes injure their backs or ribs if cast on hard ground.

Precautions to be taken in casting.

The eyes should be covered to prevent injury and a rug provided to rest the head on. An animal cannot struggle much if his head is kept down and he is not allowed to work it round towards his knees.

We can cast a pony or mule either with hobbles or with a long rope and collar.

Both these methods are well described in Hayes' Veterinary Notes, pages 462—464.

Casting bullocks.

Bullocks are cast with a long rope in a similar manner to mules and ponies. Camels are secured by having their fore legs fastened when they are in the sitting position.

Use of hobbles.

(NOTE.—To illustrate the use of hobbles place four pegs in the ground to represent the four legs of an animal and adjust the hobbles and ropes on them. Opportunity should also be taken of showing how to cast with a rope and collar, as on field service hobbles are often not obtainable.)

The twitch.

The twitch must be used with care and judgment. Its use is frequently abused in ignorant hands. The ordinary twitch for the pony, mule, camel or donkey is made of a piece of wood about 18″ long and 1½″ in diameter with a loop of soft cord or horse hair about ⅓″ in diameter, which is passed through a hole bored at one end of the stick.

Mode of applying the twitch.

To apply the twitch, pass the left hand through the loop and grasp the animal's upper lip.

Then pass the loop over the hand and twist the stick with the right hand until the lip becomes tightly squeezed by the cord. The pain thus inflicted, and which is considerably increased if he struggles, diverts the animal's attention. Nervous animals, when not under the restraint of the twitch, often struggle because they think they are going to be hurt, and in these cases the twitch is useful to show them that they will not be hurt if they stand quietly. Care must be taken to see that this instrument is not abused.

When clipping or shoeing a fidgetty animal, drivers or petty officers sometimes apply the twitch and tie the handle to the head collar to save themselves the trouble of holding it. This must never be allowed, as the animal is thus often kept in constant pain for one or two hours at a time.

Restraint, however, is sometimes necessary for animals that will not allow themselves to be groomed, clipped, shod or harnessed, and for this vice the long-rope twitch is the best corrective. It is well described on pages 113 to 117 of Hayes' "Illustrated Horse-breaking" which has been supplied to Transport Depôts in the Bombay Presidency. One of these twitches should be supplied to every Jemadar and Duffadar in the lines.

Long-rope twitch.

It has the advantage over the old twitch of only inflicting momentary pain when the animal struggles or misbehaves, and it can be relaxed when he stands still.

Its advantages.

It can be still further simplified by fastening the end of the rope to the near D of the head collar, then passing it over the poll under the upper lip and behind the rope just above the original knot.

The long-rope twitch is most effective for quieting wild and vicious mules and ponies.

Apply the twitch and tie the animal short by the head to a tree, rub him over with a pole the end of which has been rounded and smoothed. After a few plunges he will find he is mastered, and within a quarter of an hour you will be able to handle him with ease.

(NOTE.—An illustration of this is instructive and interesting to the class.)

Methods of administering medicine.

Medicine can be given to animals—

(*a*) In the food.
(*b*) In the drinking water.
(*c*) In a ball.
(*d*) As a drench.
(*e*) As an electuary, *i.e.*, made up in a palatable form with sugar, treacle, etc.

Animals will take medicine in the food, provided they are not in great pain and the taste is not nauseous. Chiretta, powdered sulphur, sulphate of iron, nitre, gentian, etc., are as a rule readily taken with the food.

Soluble medicines given in the drinking water.

Soluble medicines, such as nitre and sulphate of magnesia (epsom salts), can generally be given in the drinking water. Nauseous medicines are given in balls or drenches.

Method of making up a ball.

A ball is made up in cylindrical shape, about $\frac{1}{3}$" in diameter and $1\frac{1}{2}$" to 2" in length.

The medicine is mixed with treacle and linseed meal to give it consistency and is wrapped in thin paper.

How to administer a ball.

To administer a ball, stand a little to the right side of the animal's head, place his hind quarters in a corner, hold the ball with the ends of the fingers of the right hand, making the hand as small as possible.

Hold the tongue in the left hand as described for examining molar teeth.

Insert the right hand boldly into the mouth and place the ball quite at the root of the tongue.

Let go the tongue, close the mouth, and watch for the ball to pass down at the left side of the neck.

If it does not go down at once, a little green grass will make the animal swallow it.

To give a drench.

In giving medicine as a drench, use a soda water bottle covered with leather. Do not take the tongue out of the mouth, but hold the head well up and pour about four ounces of the medicine at a time into the back of the mouth and wait until the animal swallows it, keeping the head up.

Medicines.

General Fitzwygram says : "The object with which medicine is given is to "produce an altered, it may be an increased or it may be "a diminished, action of some organ of the body or of "the system generally."

Evacuants.

Evacuants are medicines which increase the secretions from the intestines, skin or kidneys.

They are respectively called purgatives, diaphoretics and diuretics.

Linseed oil.

Linseed oil is a good medicine for gently moving the intestines. It has at the same time a nourishing effect. Dose for a mule, bullock or pony, one pint.

For the camel one quart, but it is uncertain in its effect.

Bran.

Bran, when wetted, has a laxative effect on the alimentary canal by causing a slight irritation to the membranes, which increases the secretions and quickens the passage of the contents of the intestines.

To make a bran mash.

To make a bran mash, place 2 lbs. of bran in a clean bucket and pour in as much boiling water as the bran will absorb, then cover up the bucket and allow the bran to be steamed until it is sufficiently cool for use. Add $\frac{1}{4}$ oz. of salt.

Boiled linseed.

Boiled linseed is also a laxative and soothes the mucous membranes of the organs through which it passes.

Sulphur.

Sulphur purifies the blood and has a slightly laxative effect on the intestines.

Dose for a mule, pony, donkey or bullock, $\frac{1}{2}$ an ounce daily for a week.

Epsom salts.

Epsom salts or sulphate of magnesia is a good laxative and is cooling to the blood. It is generally used in cases of disordered liver.

Dose for the pony, mule or bullock, 8 ounces, which can be repeated after 24 hours.

Warm ghee.

Warm ghee is also used. It has a nourishing and laxative effect.

Dose for the pony, mule and bullock, one quart.

Aloes.

Aloes.—The dried juice of the aloe plant is the medicine generally given when it is necessary to purge an animal. Barbadoes aloes are always used, as their action is more certain than that of other qualities.

Although the camel frequently suffers from diarrhœa, it is difficult to move his intestines artificially.

Steel says that the only two medicines that will purge him are aloes and calomel.

Dose for a camel.

The dose for a camel is aloes 1½ ounces in two quarts of milk, or calomel ½ ounce in a ball. Neither of these medicines are used for bullocks.

Dose for a mule or pony.

A purgative dose for a mule or pony 13 to 14 hands would be—

Aloes ..... 4 drachms
Powdered ginger ..... 1 drachm } In a ball.

For a donkey—

Aloes ..... 3 drachms
Powdered ginger ..... 1 drachm } In a ball.

Aloes should not be given in cases of disordered liver, nor should a debilitated animal ever be given a purgative dose without consulting a Veterinary Surgeon.

The action of a purgative consists in causing the evacuation of the contents of the intestines with a result that the bowels are relieved from undigested material or accumulated fæces, the blood is freed from impurities, and other organs are roused to healthy action.

When giving an animal a purgative dose, the following precautions are necessary :—

Necessary precautions previous to administering a purgative.

For at least 24 hours before the physic is administered, he should be restricted to bran mashes and a short allowance of grass.

The physic is given in the early morning on an empty stomach, after which he can be exercised with a rug on.

Diet when under physic.

He should have bran mashes during the day and as much water with the chill off as he will drink.

A little grass may be allowed him.

Next morning he may be trotted up and down for a few minutes, when the physic will most likely begin to act.

Six or seven evacuations are quite sufficient, after which the patient may be fed on dry bran and a little grass until the dung assumes its natural appearance.

Remember that the animal must be continuously clothed and protected from chills from the moment the physic is given until the purging has quite ceased, after which he should be allowed a day's rest and then put to light work if he is otherwise fit for it.

Diaphoretics.

Diaphoretics are medicines used to increase the action of the skin by stimulating its glands and pores.

They answer to the sweating mixture given to a man in the burning stage of fever.

Diuretics.

Diuretics stimulate the kidneys and cause increased secretion of urine, by which impurities are removed from the blood. Nitre (nitrate of potash) and nitric ether (sweet spirits of nitre) act both as diaphoretics and diuretics and are the medicines generally used.

They must not, however, be given in cases of irritation of the urinary passages as denoted by profuse staling, or discolouration of the urine, when boiled linseed should be given or linseed tea (see *Demulcents*).

Dose for a camel.

The dose for a camel would be—

Two ounces nitre ... { Twice daily for a week given in the food or water,

or

Four ounces nitric ether ... Do. do.

Dose for a mule, pony or bullock.

For a mule, pony, donkey, or bullock ½ ounce of nitre twice daily in the food or water for a week ; or

One ounce of nitric ether twice daily for three or four days in the food or water.

Sedatives.

Sedatives.—See Fitzwygram, page 204.

Diffusible stimulants.

Diffusible stimulants are useful for exciting the general circulation and relieving congestion in internal organs.

Spirits of nitric ether and aromatic spirits of ammonia (sal volatile) are generally used ; when these are not procurable, camphor or assafœtida will answer the purpose, also alcohol in any form. The doses are for a mule, pony, bullock or donkey—

Spirit of nitric ether, one ounce in the food or water or as a drench in a pint of water ; or

Aromatic spirits of ammonia, 1 ounce in food or water or as a drench in a pint of water ; or

Assafœtida, 2 drachms as a drench in a pint of water ; or

Camphor, 2 drachms ditto, ditto ; or

Whiskey, rum or other spirit, 2 ounces in a pint of water.

For a camel, double the dose of a mule or pony.

Febrifuges.

A febrifuge is a medicine which relaxes the walls of the arteries, which are in a tense state during the burning stage of fever, and promotes action of the skin.

Nitre and camphor are given.

Dose for a camel—

Camphor ..... 4 drachms
Nitre ..... 1 ounce } In a ball.

For a mule, pony, donkey or bullock—

Camphor .....1 drachm
Nitre .....2 drachms } In a ball.

Tonics are used for restoring the appetite and strength of debilitated animals.

Tonics. They also give tone to the digestive system and improve the condition of the blood. Of mineral tonics, sulphate of iron and arsenic are most generally used; of vegetable tonics, chiretta, gentian and ginger.

These are all readily taken in the food.

Iron. Iron should not be given in cases of indigestion or disordered liver.

Arsenic. Arsenic is a dangerous medicine and should only be used under the orders of a Veterinary Surgeon.

Common salt. Common salt purifies the blood and improves the appetite.

It is given daily in the food of all Government animals.

Tonic dose for a camel. *Tonics.*—Dose for a camel—Sulphate of iron, 4 drachms daily in a ball for a week; or

Chiretta, powdered, 4 ounces daily in the food for a week.

For a bullock. For a bullock—

Sulphate of iron..... 1 drachm.
Powdered gentian ..... 1 „ } Daily in the food for a week.

For a mule, pony or donkey. For a mule, pony or donkey—

Sulphate of iron ..... 1 drachm.
Ginger..... 2 drachms. } Daily in the food for a week, or

Pounded chiretta, one ounce daily in the food for a week.

Chiretta is also given as an infusion.

Take 4 ounces of pounded chiretta, pour one quart of boiling water on it

Chiretta. and let it infuse like ordinary tea. When cool, strain it off.

Dose for a camel. Dose for a camel—

1 quart as a drench daily for a week.

Dose for a mule or pony. For a mule or pony—

15 ounces as a drench daily for a week.

Demulcents.—Linseed is generally used as a demulcent either by boiling it to

Demulcents. a jelly or pouring boiling water on the seeds, one pint of water to one ounce of seeds.

Let it stand till it is cold. When given in the food, it soothes the mucous membranes of the organs through which it passes, including the urinary channels, and protects them from irritation.

Antiseptics are used for the treatment of wounds and sores. They act as a

Antiseptics. poison to certain germs in the air which produce putrefaction if they establish themselves in wounds. The

medicines generally used as antiseptics are—

Carbolic Acid—(*a*) As a lotion { Carbolic acid..... 4 drachms. / Water..... 1 pint.

(*b*) As carbolic oil—

Carbolic acid ..... 6 drachms.
Sweet oil ..... 1 pint.

Perchloride of Mercury (corrosive sublimate) *Lotion*—

Perchloride of Mercury..... 1 scruple.
Water ..... 1 pint.

Macdougall's Powder is used for sprinkling the stalls of sick animals to destroy the germs of disease.

Astringents.

Astringents are used internally and externally.

Internally they arrest excessive secretions of the mucous membranes and bowels.

Dry bran has an astringent effect on the intestines, also opium, catechu and chalk.

Astringent dose for a camel.

For the camel the following astringents are used in combination to arrest diarrhœa :—

Opium .....2 drachms. } Mixed with coarse sugar and given as a
Catechu .....4 drachms. } ball or fed from the hand if the animal will
Powdered chalk.1 ounce. } take it.

Dose for a mule, pony or bullock.

For a mule, pony, bullock or donkey—

Opium .....1 drachm. } Mixed with coarse sugar and fed from the
Catechu .....1 drachm, } hand if the animal will take it ; otherwise,
Powdered chalk.4 drachms. } given as a ball.

Astringents, when applied externally, check the formation of unhealthy granulations in wounds and promote the process of healing. They are also used for washing the eye when inflamed.

Astringent lotion.

Astringent lotion—

Alum..... 1 ounce.
Water ..... 1 pint.
or
Sulphate of zinc..... 2 drachms.
Water ..... 1 pint.

Astringent ointment.

Zinc ointment—

Sulphate of zinc ..... 1 drachm.
Vaseline or lard ..... 1 ounce.

Ointments are objectionable in dry weather. They collect dust and other small particles blown about by the wind.

Caustic.

Sulphate of copper (bluestone) is used as a caustic for cutting back excessive granulations or unhealthy growths in wounds.

Nitrate of silver (lunar caustic) is also used for the same purpose, but is more powerful than the bluestone.

It melts and evaporates if long exposed to the air.

Use of external irritants and stimulants.

External irritants and stimulants are used for the purpose of exciting artificial inflammation and stimulating the blood vessels and absorbents to increased energy.

This artificial inflammation may be employed with a view to obtaining any of the following effects :—

(*a*) Increased reparative action where injured parts are badly supplied with blood, such as tendons, ligaments, bones.

(*b*) Stimulating sluggish wounds to heal by their action and by attracting an increased supply of blood to hasten the reparative process.

(*c*) Relief of internal inflammation.

(*d*) Increasing the activity of the absorbents in removing newly-formed deposits, such as tumours and thickening of the tendons, ligaments, and skin ; also bony deposits, such as splints and ringbone.

Rubbing with the hand is a mild stimulant and tends to reduce fullness of the legs.

Liniments.

Liniments and embrocations stimulate the skin and promote absorption. The following materials for a liniment are easily obtainable :—

Camphor...	1 ounce.
Turpentine	1 drachm.
Oil	4 ounces.

Mustard.

Mustard is frequently used as a stimulant and is easily obtainable.

It is used principally in cases of sore throat and in inflammation or congestion of the lungs and liver.

For an application to the lungs or liver one pound of mustard is required. It should be mixed with water so as to form a soft paste and rubbed in for a few minutes over the affected part. A sheet of paper should then be placed over the mustard to prevent the rug being soiled. The patient should be watched, as he is likely to become excited when the mustard begins to burn. After 20 minutes the plaster should be washed off and the part carefully dried. For an application to the throat about eight ounces of mustard is required.

Tincture of Iodine.

Tincture of Iodine is a mild stimulant and absorbent. It should be painted on daily until soreness is produced.

Wounds, bruises and sprains should not be stimulated until all heat has left the part.

An inflamed wound can be cooled by poultices, but they must not be persisted in, or the tissue will become too soft.

The heat of bruises and sprains is reduced by fomentations and cold applications.

Blisters and firing.

Strong blisters and firing are severe irritants ; they should only be resorted to under the advice of the Veterinary Surgeon. They are never applied until all heat has left the part.

Biniodide of Mercury.—One part to 16 parts of lard is generally used as a strong blister.

One in 30 is sufficient for a gentle stimulant, *i.e.*—

Biniodide of mercury ... ... 2 grains.
Lard ... ... 1 drachm.

Before firing or applying a blister, the hair should be shaved off the part.

A blister should be well rubbed in for 15 minutes.

Its irritant effect will have ceased after 24 hours, and the blister can then be carefully washed off.

This will diminish the chance of a blemish.

LECTURE XI.

Ordinary Diseases of the Mule, Pony, Donkey, Camel, and Bullock. Causes and Treatment of Diseases.

Diseases of transport animals.

In speaking of the ordinary diseases of transport animals, we will except those of the elephant, which have already been discussed, and treat of the diseases which affect the other animals, making separate mention of some specific disorders, which are peculiar to the camel and bullock respectively.

Diseases chiefly due to errors in feeding.

When mentioning the diseases of animals, epizootic is used in the same manner as the term epidemic in human maladies.

As most of the diseases of animals are due to errors of feeding, we will make a short study of the organs of digestion and follow the course of the food on which the body is nourished.

Digestion of the food.

The food is grasped with the lips, cut with the incisors and carried back to the molar teeth by the tongue. The molars grind up the food, and during this process it is mixed with saliva, which helps to dissolve and separate the different nourishing properties. The food is next passed to the stomach which secretes gastric juice, and by its peculiar contractions, churns the food until it becomes a thick fluid called

Chyme.

" chyme," which passes on to the intestines. The action of the saliva and gastric juice assists the stomach in its work, which is called digestion or rumination, and it is during this process that the bullock and camel chew the cud.

The horse, mule and pony having a small stomach, their digestion only takes a few hours and is not so complete as in the bullock and camel, which have much larger stomachs. The two latter animals can consequently accommodate a large supply of food, and as they retain it in the stomach much longer than the mule or pony, the juices have more time to act on it, and the chyme of the bullock and camel, when it passes to the intestines, is more completely prepared for absorption into the system than that of other animals which digest their food more quickly.

Chyle.

The material which leaves the stomach is again acted upon in the intestines by other digestive juices (from the liver and pancreas) which complete its preparation for absorption into the system, and it becomes a fluid called chyle. The veins and absorbents of the small intestines now take up the nutritive parts from the food and the refuse is passed on to the larger intestines. These are also furnished with absorbents, which take up whatever nutriment remains in the food, and the balance is passed out of the body as fæces.

The nutritive parts taken up from the chyle help to feed the blood, which in its turn nourishes the various tissues and organs of the body, including the skin, which also passes off waste products,

Now if this digestive process and nourishment of the body would invariably go on without a hitch, animals would always be in excellent condition provided that good food and water were placed before them. But things are constantly going wrong; the food is often bad in quality and deficient in quantity. The animal is overworked; the skin is neglected and its pores become clogged; the blood becomes poor and foul; the other organs of the body are weakened; the flesh wastes away from want of sufficient nourishment; food passes through the body without having been assimilated, and the machine gets generally out of working order.

This is the state in which we often find a remount, and we must learn how to renew his health and strength, so that he will earn his keep and also do us credit.

You will now understand the old saying that "The goodness of a horse goes in at his mouth." It means that he will never be a good one unless good stuff is put into him.

Indigestion.

The term indigestion implies an impaired condition of any of the organs which help to convert the food to the state necessary for absorption, and is the primary cause of most of the diseases from which men and animals suffer.

Preparation of food.

We should therefore be careful, more especially in the case of delicate animals, to give the food so prepared that the digestive organs will be able to act upon it properly.

For this reason all grain should be well crushed, and hay and grass should be of unexceptionable quality. The reason that we always water before feeding is that the water quickly passes through the stomach and leaves it ready to concentrate its juices and energy on the grain. If we water after feeding, we dilute and weaken the action of the saliva and gastric juices in the stomach, and the water is likely to carry undigested grain into the intestines. This may ferment and cause flatulency and colic.

Debility.

We can now couple with indigestion the subject of debility, the latter being the certain result of insufficient and irregular nourishment of the system. Debility is characterised by low condition, pale mucous membranes indicating poor blood, a weak pulse, constipation and general langour.

The treatment for an animal in this state is as follows:—

Look to his teeth and see that nothing interferes with the grinding process; be on the look out for internal parasites, which will presently be described, change his food; have his grain well ground and mixed with chaff or bhoosa so that he cannot bolt it; give him lucerne or guinea grass and carrots cut in slices lengthways. Have the intestines cleared by a laxative dose and an enema. Give some sulphur and nitre to purify the blood and act as a diuretic, and after a day or two follow up the treatment with a tonic.

If the weather is cold, keep his body and extremities warm.

Colic.

Colic is a disease caused by defective digestion, the result of injudicious feeding. In the mule, pony, bullock and camel there are two descriptions of colic—spasmodic and flatulent.

Spasmodic colic is a spasm of the intestines, due to the irritation caused by the passage of undigested food. It is also caused by chills and exposure. Painful spasms of the belly come on at intervals, the animal paws with his fore feet, looks round at his side. kicks at the belly, and lies down and rolls. The pain comes on and ceases suddenly, and the animal is apparently quite well in the intervals between the spasms.

Spasmodic colic.

In *flatulent colic* the intestines are distended with gas formed from undigested or decomposed food. The pain is continuous and the belly is swollen with gas. Spasmodic colic, if not relieved, results in flatulent colic.

Flatulent colic.

The treatment for colic consists in stimulating the intestines to pass off the gas and other offending matter. Clothe the body warmly, hand-rub and foment the belly, and give an enema and a diffusible stimulant (page 92) suitable for the class of animal. If there is no relief in half an hour, repeat the diffusible stimulant, when the symptoms will generally pass off. Give the animal soft food for two or three days.

If drugs are not available, or if the above treatment is unsuccessful, give for a mule, pony, or bullock either of the following :—

Warm ghee one pint, to soothe and relax the distended intestines, or linseed oil one pint, or warm beer one quart, mixed with one ounce of powdered ginger. Double the above amounts for a camel.

As before stated, the skin is an important factor in the machinery of the system, and we will notice as shortly as possible some of its unhealthy and diseased conditions.

The skin.

In health it is soft, elastic, and pliable ; in a disordered state it becomes dry and harsh and tightly bound to the tissues beneath it. This state is known as " hide-bound " and is generally accompanied by a staring coat.

Hide-bound.

In a remount it generally accompanies indigestion and debility, and the skin is clogged with dirt and scurf.

If the animal has a rough coat, remove it with the clippers, and we can then get at the skin and clean it thoroughly by hand-rubbing and brushing. If the skin is very dirty, it may be washed once with soap and warm water mixed with a little soda, which helps to clear the skin from scurf.

Water is not of much use in cleansing the skin of a mule, pony, or bullock, and we run the risk of chill by using it. It will, however, help to remove an outer crust of dirt and scurf.

Washing with water unsuitable for a mule or pony.

To further relieve a hide-bound condition, we should give a diaphoretic to stimulate the skin to increased action ; also linseed, which acts on the skin.

Cooling food, such as mashes, carrots, and green grass, should be given. An ounce of common salt daily in the food is useful and is easily obtainable.

Tonics will do good, but do not give iron if the animal's mucous membranes and temperature show signs of deranged liver.

The other skin diseases of transport animals may be divided into two classes—parasitic and non-parasitic.

Mange.

The parasitic skin-disease or true mange arises from the presence of a small insect which burrows and multiplies in the skin, causing intense itching. The disease begins in the mane and tail and gradually spreads over the body.

The hair falls off, leaving the skin bare and wrinkled and covered with small vesicles which burst and form small scabs on the skin. This disease is contagious and easily spread by carelessness, such as using the same brush, saddle or clothing for diseased and sound animals. **The mange insect prefers an unhealthy skin to a healthy one, and should never appear amongst transport animals when proper stable management is enforced.**

If by chance the disease should occur from contact with outside animals, cleanliness and prompt remedies should quickly stamp it out.

Eczema or surfeit.

Non-parasitic skin-diseases, which may be roughly called eczema or surfeit, are due to improper feeding, indigestion and derangement of the internal organs. These diseases appear in the shape of small blisters somewhat similar to that of true mange, or in lumps which appear on different parts of the body and again disappear in a few days ; often the hair falls off in large quantities.

In moist, hot countries animals also suffer from prickly-heat, an inflamed condition of the sweat glands and pores of the skin.

In many cases the non-parasitic disease closely resembles the parasitic, and it is difficult for an amateur to detect the difference. We should therefore at once obtain the opinion of a Veterinary Surgeon when we find that any of our animals have contracted a skin-disease in which the symptoms resemble those of true mange. In treating parasitic skin-disease, our efforts must be devoted to the destruction of the parasites and their eggs. Mange is such a common disease among badly-kept camels that we will speak of it again under the special diseases of that animal.

Treatment of true mange.

Treatment.—Isolate affected animals. Keep all their gear quite separate. Do not let their attendants mix with or handle healthy animals. Wash the whole of the skin thoroughly with soap and water mixed with soda; this will clean the surface of the skin, open the pores, and permit a beneficial use of the following ointment, with which we endeavour to poison and destroy the insects :—

Oil of turpentine	8 ounces.
Mustard oil	8 „
Powdered sulphur (sublimate)...	Sufficient to make an ointment.

Rub the ointment in thoroughly and allow it to remain for two days, after which the washing process should be repeated and the ointment again rubbed in. Continue the treatment until all itching ceases and the skin begins to heal.

In the mean time we should give soft food, a dose of linseed oil, and—

Sulphur (sublimate) ...	½ ounce	} Daily in the food for a week.
Nitre	2 drachms	

This treatment cools and purifies the blood and is laxative, diaphoretic, and diuretic.

Treatment of non-parasitic skin-disease.

In non-parasitic skin disease we must endeavour to remove the exciting cause, *viz.*, derangement of the digestive organs.

General treatment, the same as for *indigestion*. Here we require change of food, a laxative, or purgative dose, a cool sheet over the animal to keep off flies and dust by day, and under the rug at night to prevent irritation from coarse blanketing. Some boiled linseed and green food should be given daily. If the animal is already on green food, substitute dry grass. Keep the irritated surfaces clean and dress them twice daily with carbolic lotion.

Scaly back.

We also meet with a diseased condition of the skin of the back and withers, caused by the continued pressure of the pack saddle. This condition sometimes does not declare itself until several weeks after a long march, when a scaly, fungus growth appears, and if work is continued, a sore forms underneath it. It seems that the continued pressure of the pack saddle interferes with the circulation of the blood and the action of the sweat glands, and the skin is thereby rendered unhealthy. Backs are often not properly dried and brushed after a march when the skin most requires stimulation.

Local treatment only is required. Soften the part with oil and afterwards wash with soap and water, when the scales will come off. Apply zinc lotion to the skin underneath and repeat the washing daily until scales cease to form.

If a wound is exposed when the scales are first washed off, treat as for sore back. An ordinary case takes about a month to get right, but a cure can be more quickly effected if a counter-irritant is applied round the affected part. Give plenty of exercise, or draught work if the draught saddle does not hurt the back.

Bots and worms.

The stomach and intestines of the mule, pony, and donkey are subject to the visitation of bots and worms.

These parasites are rare in bullocks and camels, but there is a peculiar grub which establishes itself in the nostrils of the latter animal and causes considerable irritation.

Bots.

Bots are the produce of the gad-fly, which lays its eggs on the chest and knees of the animals. These are licked off and adhere to the animal's tongue.

Small maggots are hatched and passed into the stomach, to the side of which they attach themselves for some months till they are full grown, when they let go their hold and are passed out of the system in the fæces. At this period they look like a brown chrysalis. Their presence in the stomach does not seem to be hurtful to the animals except when they exist in very large quantities.

Intestinal worms.

Worms are found in the intestines. They generally select a debilitated and weakly animal and feed on the secretions of the intestines. When they increase in numbers, they cause great loss of condition and deterioration of the general health, shown by a staring coat, loss of appetite, and irritation of the intestines indicated by the passing of mucous with the fæces.

The treatment consists in the destruction of the worms and restoration of the general health, change of food, and one ounce of salt daily. Give one drachm of sulphate of iron daily for a week, and then a purgative dose with the usual precautions. After the worms have been expelled, if the animal is out of condition, treat for indigestion and debility.

Treatment for worms.

Derangement and *congestion* of the *liver*.—The principal work of the liver is to secrete bile, a yellow fluid, which it manufactures from the blood and discharges into the intestines to assist in he proper digestion of the food. When the liver is deranged, it temporarily ceases its functions, and the bile, instead of being conducted to the intestines, is absorbed by the blood. This is manifested by a yellow tinge in the visible mucous membranes, particularly in that of the eye. The derangements of the liver vary from slight inactivity to congestion and inflammation. If these diseases are neglected or improperly treated, the liver may become permanently diseased and enlarged.

The liver.

Derangements of the liver.

Disease of the liver is due to high feeding and insufficient exercise ; also to chills caused by washing the animal with cold water, or want of proper clothing during cold nights. The symptoms of the less serious stages are yellow mucous membranes, hard clay-coloured fæces with offensive odour, hide-bound condition of the skin. There may be pain over the region of the liver. Fever is sometimes present.

Causes.

Treatment.—Avoid the exciting causes; give sulphate of magnesia as an aperient ; soft and easily-digested food ; also diaphoretics to relieve the hide-bound condition.

Treatment for deranged liver.

Relieve congestion and pain over the liver by fomentations and a mustard plaster.

Clothe warmly if the weather is cold. Give vegetable tonics during convalescence and plenty of exercise.

In the camel a blister is generally applied to the region of the liver in cases of congestion, as the skin is too thick for mustard to have much effect.

Diarrhœa is not prevalent among transport animals if the stable management is good. The exception to this is the camel, which is very subject to diarrhœa and dysentery.

Diarrhœa.

In the mule, pony, bullock and donkey, diarrhœa is often simply an effort of nature to expel some irritating matter from the intestines, and we should therefore be cautious how we check it and should in the first instance assist nature by stopping the daily grain and giving easily-digested food and a laxative dose of linseed oil. The animal should be warmly clothed.

If the diarrhœa does not yield to this treatment, we should give an internal astringent as prescribed in the previous lecture.

Diarrhœa is sometimes caused by eating uncleaned grain or forage, which often contains a large quantity of grit and sand. In these cases earth and sand will be visible in the fæces. Diarrhoea also results from disease of the liver, in which case the symptoms of derangement of that organ will be present.

Causes of diarrhœa.

In camels it is often the result of change of locality when they eat acrid plants to which their stomachs and intestines are unaccustomed.

It should, however, be noted that in this disease, as in most others, the best preventive and remedy is good stable management.

Wounds and *Bruises*.—The wounds which a Transport Officer has chiefly to deal with are sore backs and girth galls in pack animals, neck galls in draught bullocks, and collar galls in draught mules and ponies.

Wounds.

Sore backs are generally the result of the following combinations :—

Poor condition.
Badly stuffed and fitted saddles.
Bad loading.
Loose girthing.

The prevention of galls and bruises, which is better than the cure, will be dealt with when speaking of the fitting of saddlery, loading, and routine on the march ; **but it may be taken for granted that in nine cases out of ten saddle galls are preventable.**

An animal in good hard condition, with plenty of muscle over his back and ribs, is much less likely to gall than one which is scraggy and ill-kept.

In saddle galls we find the following degrees which are pretty impartially distributed over the cases which come under notice:—

1*st.*—The fresh gall where the hair is rubbed off and the skin but slightly abraised.

2*nd.*—The neglected bruise, where the skin is hard and dead, but still adheres tightly, covering an inflamed wound.

3*rd.*—An open sloughing wound more or less inflamed. If this is on the withers, there are generally sinuses or matter channels running downwards under the skin on either or both sides of the withers. These sloughing wounds tell greatly on the animal's strength and condition.

No. 1 may have happened accidentally owing to an unusually long march or stiff hill work and is easily put right.

Nos. 2 and 3 are the result of neglect and ignorance, accompanied by prolonged suffering to the animal and will take some time to cure.

Severe galls are nearly always preventable. Except in cases of great emergency, there is no excuse for neglecting slight injuries and thus rendering the animals unfit for work for many weeks.

In all wounds the hair should be cut away round the the edges. This prevents the accumulation of dirt, which always irritates the wounds.

Treatment of wounds and galls.

The further treatment of No. 1 consists in washing the wound clean and applying zinc lotion, which will dry up the abrasion and harden the injured skin. Five or six days of this treatment should effect a cure.

For No. 2 we must poultice until the dead skin can be removed surgically, when the actual wound will be exposed, which requires antiseptic treatment.

Keep the wound perfectly clean and apply carbolic oil.

To protect the wound from the air, take a small piece of cotton wool, pull it apart with the fingers until it is only a thin film and apply it to the wound. The serum which exudes from the sore will fill up the interstices of the cotton wool and a scab will form in half an hour which will effectually protect the wound from the action of the air.

By applying cotton wool in this way, we also economise its expenditure and it cannot be blown off by the wind. This often happens if a thick lump of wool is applied.

The sore should be washed and dressed morning and evening. If the healing process is sluggish, a stimulating blister should be applied round the wound and well clear of it. This will hasten the process of repair.

In No. 3 we must reduce the inflammation by poulticing for a day, and the further treatment should be the same as for No. 2.

Sinuses.

If sinuses are present, they must be opened with the knife and well syringed with carbolic or perchloride of mercury lotion.

Collar gall.

A draught animal suffering from collar gall is as a rule quite capable of carrying pack loads, and a slight gall caused by a pack saddle will generally heal while the animal is being worked in draught. In both cases the wounds must be carefully treated and watched.

Cuts.

In a *cut wound* we should always endeavour to get the edges together so as to heal and unite by first intention.

One or more sutures are generally necessary, assisted by bandages. The wound should be previously syringed with antiseptic lotion, and after the lips have been brought together, the exposed edges should be covered with antiseptic dressing and a film of cotton wool to keep out the air.

It is no use trying to secure union by first intention if the wound has had time to get much inflamed or if any dirt has got inside.

Granulations.

Granulations are formed of materials deposited by the blood for the repair of injured structures. Granulations, which are excessive and rise above the surface of the surrounding skin, are called proud flesh and must be kept in check by pressure or the application of sulphate of copper or lunar caustic.

Maggots in wounds.

If a wound has been so neglected that maggots have got into it, pick out with the forceps those that can be seen and syringe the wound with oil of turpentine. This will quickly kill the remainder and they should then be syringed out of the wound with antiseptic lotion. *Remember that, when dressing a wound, the hands, forceps and all instruments should be constantly dipped in antiseptic lotion and the water for washing the sore should have some antiseptic in it, such as a few drops of carbolic acid or phenyle.*

Wounds and sore backs in the camel.

Wounds and *sore backs* in the camel demand particular notice and will be spoken of in the special diseases of that animal.

ORDINARY DISEASES.

Diseases of the feet.

The diseases of the *feet* with which a Transport Officer has commonly to deal are—

Pricks in shoeing.
Punctured sole.
Thrush.
Laminitis.
Bruised sole.

The structure of the foot will be shortly explained in the lecture on shoeing.

To ascertain the seat of injury in the foot, press the foot all round with the shoeing smith's pincers ; when the painful spot is pressed, the animal will flinch.

Pricks in shoeing.

Pricks in shoeing are caused by nails having been driven into, or too near, the sensitive lining of the wall.

The *sole* is sometimes punctured by the animal treading on stubs of iron or broken glass. The treatment for these accidents is to cut well down to the injured membranes with a drawing knife so as to allow a free escape of any pus which may form and which would otherwise burrow channels for itself along the sole. Consult a Veterinary Surgeon as soon as possible ; give cooling food and some laxative medicine. Poultice the foot.

When the poultices have caused the heat to subside, put a wet swab on the foot. This may consist of a piece of numnah fifteen inches long and eight inches broad and rounded at the corners. Soak it in cold water, double it, and secure to the pasterns with a piece of tape. The double fold of wet numnah will lie over the foot and keep it cool. If the air is dry, water should be sprinkled over the swab every half hour. The hole in the sole should be stuffed with tow dipped in antiseptic lotion and changed twice daily. A light boot should be fastened to the foot to keep the tow in place.

Cold swab for the feet.

The occurrence of tetanus or lock-jaw is generally in connection with, or a result of, injuries or wounds, such as docking, castration and punctures in the sensitive part of the feet. It is a continued contraction of the muscles of the body including those of the jaw.

Tetanus or lock jaw.

The animal is nervous and frightened and the nostrils are dilated.

The haws or membrane at the inside corners of the eyes protrude constantly and are again withdrawn.

Put the patient in a dark box and keep everything quiet round him.

Keep him warm if the weather is cold. In warm weather do not clothe him if he sweats.

Give him a drachm of " Extract of Belladonna " four times a day by placing it in the mouth and allowing it to dissolve.

If he can drink, keep up his strength with linseed or oatmeal gruel and milk.

As soon as the symptoms of tetanus are noticed, consult a Veterinary Surgeon.

Thrush.

Thrush is an inflamed condition of the sensitive frog, generally caused by want of cleanliness. An acrid smelling, whitish discharge issues from the cleft of the frog. In neglected cases maggots are found in the frog.

Treatment. If the animal is lame, give a purgative dose and reduce the inflammation by poultices.

Kill the maggots with turpentine and remove them from the wound.

Subsequent treatment consists in keeping the foot dry, removing with the drawing knife all pieces of decayed frog, and the daily application of calomel or burnt alum in the affected parts, which should afterwards be covered with tow. Exercise daily if there is no lameness.

In wet weather animals subject to thrush should have the frog smeared with tar before they go out.

Laminitis. *Laminitis* affects transport bullocks more than mules and ponies. It is an inflamed condition of the sensitive structures of the feet and causes extreme lameness and pain, which is often accompanied by fever.

Treatment.—Soft and cooling food; poultices to the affected feet. Give a laxative dose. For a full description of *laminitis* in the pony see Fitzwygram, pages 718 to 722, or Hayes, pages 89 to 99.

Bruised or worn sole. *Bruised* or *worn sole* is also liable to occur to all transport animals working unshod on metalled roads or on rocky ground in wet weather, particularly those carrying loads.

Symptoms.—The feet are hot. The animal is sometimes very lame, and the sole and crust are much worn.

Treatment.—Soft cooling food. Poultices to reduce the inflammation; afterwards cold swabs and bedding to stand on.

Exercise on soft ground until the feet have grown.

Fever. *Fever* is a condition of the body characterised by rise of temperature.

Symptoms.—Loss of appetite, dullness, high temperature, quickened pulse and breathing, dry hot mouth and skin.

Treatment.—Give diaphoretic medicine twice a day until the fever abates; keep the body and legs warm; give soft cooling food.

When the skin is acting well, give vegetable tonics for a week.

If the fever is prolonged, keep up the strength by nourishing food.

Catarrh or cold. *Catarrh* or *cold* is the result of chill or exposure.

Symptoms.—Sneezing, coughing, running at the eyes, slight fever, and yellow discharge from the nose.

Treatment.—Cooling food; clothe warmly; steam the head with a bucket of hot water, placing a blanket over the head to let the steam have full effect. If the cough is very troublesome, put a mustard plaster on the throat. Give diaphoretics. Let the patient have plenty of fresh air.

Green bamboo leaves are beneficial for the cough.

The symptoms and treatment of fever and catarrh are similar in the camel, pony, mule, bullock, and donkey.

Strangles. *Strangles* occurs in the mule, pony and donkey.

It may be described as an infectious fever to which growing animals are subject on being first domesticated, and results in an abscess generally situated underneath the jaws.

The animal is feverish and sometimes will not feed. The tumour appears in a day or two and bursts in about a week. In bad cases, when the abscess forms near the throat, the breathing is interfered with, but generally the disease is easily got over.

Treatment.—Isolate with all usual precautions. Give cooling and tempting food to keep up the strength.

Give a laxative dose if the intestines are constipated. Keep the body and extremities warm.

Help the abscess on by fomentations or poultices until it bursts.

Give a diaphoretic if there is much fever. When convalescent, give tonics.

The camel is attacked with a very similar disease, but it is not certain whether it is a specific fever as in the cases of ponies and mules.

The treatment of strangles in the camel is precisely similar to that prescribed for mules or ponies.

Sprains.

Sprains in transport animals as a rule occur in the fetlock joints and the tendons below the knee and hock, also in the shoulders and hips.

The symptoms are—lameness and heat and swelling in the injured part.

Treatment.—Entire rest, cooling food, fomentations followed by cold applications when the inflammation has subsided. As a rule more or less thickening of the injured part remains when the heat and pain have left it. In this case a strong blister is generally applied to promote the absorption of the thickening.

Rheumatism.

Rheumatism is a peculiar inflammation which, when it occurs in transport animals, generally attacks the muscles and joints of the limbs.

Symptoms.—Lameness, heat and pain in the affected parts. Difficulty of movement.

Treatment.—Cooling food and laxative medicine. Give a diaphoretic. Foment the affected part and stimulate with liniment. Keep the animal warm and bandage the affected part after fomentation.

Glanders and farcy.

Glanders and *farcy* are practically the same disease.

Tumours break out on the inside of the thighs and fore-arms and on the neck, accompanied by fever and swelling of the limbs. Discharge from the nostrils, generally from one only, is of a thin glairy, greenish-yellow colour. Ulcers with ragged edges appear inside the nostrils. A gland of the lower jaw becomes slightly enlarged ; it is generally found on the same side as the discharge and feels hard and adheres to the bone. As the disease advances, the animal refuses his food and makes a noise in his throat when breathing.

Precautions against infection.

As soon as the above symptoms are observed, put a nose bag on the affected animal to prevent the discharge being spread about. Isolate him and also the animals standing on each side of him. Send for a Veterinary Surgeon. If he cannot be procured, consult some experienced person, and if he agrees that the disease is glanders, destroy the affected animal at once and burn the body and all gear which has been in use with him.

The attendant's clothing should be disinfected by boiling it in water with carbolic acid in it. Be very careful when handling a glandered animal, as the disease is communicable to man and other animals. Wash the hands thoroughly, especially under the finger nails, after handling suspicious cases.

Segregate all animals which have been in contact with, or have had access to, the same drinking trough as the affected animal. Dig up his standing for a depth of two feet. Put in a layer of two inches of quicklime and fill up with fresh earth and gravel.

Glanders generally runs a very quick course in the mule and donkey. It does not affect the ox.

Anthrax.

Anthrax is a disease to which all transport animals are subject. It is a specific fever caused by the introduction with the food or water of certain spores or germs into the blood which multiply rapidly. The blood becomes thick and dark coloured, and there is considerable difficulty in breathing. In the pony, mule, and donkey, there are two distinct forms of this disease.

In the first the symptoms are heat and rise of temperature, loss of appetite, weak and frequent pulse, difficulty in breathing, tossing the head, mucous membranes dark red. The animal sometimes dies in two or three hours ; other cases run on for two or three days.

In the second form, in addition to the above symptoms, there is considerable swelling of the head and neck. In these cases the disease often runs a longer course.

Anthrax in the bullock.

In the bullock, besides the feverish symptoms, an inflamed tumour breaks out on the back or other parts of the body.

Anthrax in the camel.

In the camel also boils and eruptions break out, especially involving the posterior portions of the body. There is a thick red discharge from the nostrils, and blood-stained fæces are discharged.

After death the bodies of animals which have died of this disease remain stiff for a very short time and decomposition rapidly sets in.

They should be burnt, together with the animal's stable gear.

Segregation and precautions as in glanders should be carefully carried out.

Treatment of anthrax.

Treatment seems to be of little avail ; about ten per cent. of those attacked recover, and these are generally the mild cases.

Anthrax germ.

In localities where anthrax is prevalent, we should be particular about forage. The anthrax germ is found in marshy places, and we should avoid giving grass cut from such localities or watering from marshy pools. The anthrax germ maintains its vitality in a wonderful way.

It has re-appeared in grass growing on the graves of anthracoid carcases.

Surra.

Surra is a relapsing fever which occurs in the camel, pony and mule. The animal gradually wastes away and dies in about two months.

Special Diseases of the Camel.

The disease, which is described in Ryland, page 154, and Hayes, page 346, is due to parasites in the blood, which are taken into the system with impure water or grass grown on marshy ground.

The attacks of fever last about four days During this period the mucous membranes pale and those in the eyes and nostrils have dark-coloured spots on them.

There are generally dropsical swellings about the chest and sheath, due to the watery condition of the blood.

The appetite is unimpaired and the animal does not appear to suffer pain.

Treatment is of no avail, as the parasites have great vitality.

Precautions against infection and contagion.

Reports of epizootic diseases.

Full instructions regarding precautions to be taken on the outbreak of epizootic disease and the reports that have to be made are given in A. R. I., Vol. VIII, section VI, and Vol. V, paras. 1951 and 1891.

Special Diseases of the Camel.

Bots on the nose.—These are similar to the bots in the horse's stomach, but are a good deal larger. They attach themselves to the nasal passages of the camel, causing great inconvenience and seriously interfering with the general health.

Camel bots.

Symptoms.—A reddish discharge from the nostrils, continued shaking of the head, dullness and loss of appetite.

The bots come away in due time, but at present no remedy has been found to secure their easy expulsion. Steel says that little is known about them, and suggests that the different forms of sore throat to which the camel is subject may very possibly owe their origin to the presence of these parasites. He also suggests that gargles of carbolic lotion or turpentine liniment might hasten their removal.

Inflammation of the head or Kapali is a troublesome disease. It affects different parts of the head and is thought to be the result of chill as it generally comes on after the animal has been watered at the end of a march. A tumour generally appears on the top of the head. Sometimes it comes in the ears, nose or eyelids. There is always a discharge from the nose.

Inflammation of the head.

If the disease is not arrested, it results in extensive sloughing of the affected parts. When the inflammation extends to the brain, there is no chance of recovery. The treatment consists in constant fomentation of the head to reduce the inflammation. Laxative food and diuretics should be given.

The disease is more fully described by Steel, pages 74 and 75, and Ryland, pages 138 and 139.

Pneumonia in the camel.

The camel is frequently affected by Pneumonia, or Inflammation of the Lungs, the result of neglected catarrh.

The symptoms are—frequent and painful cough, quick and laboured breathing, and a profuse, rust-coloured discharge from the nostrils—high temperature.

Treatment.—Keep the animal as warm as possible and obtain shelter from rain and wind. Give diffusible stimulants. Rub the throat and chest with oil of turpentine.

Keep up the strength by hand-feeding with balls of ghee and flour.

Fits.

Fits are brought on in the camel by exposure to severe weather. The animal rolls on the ground bending the neck backwards.

Treatment.—Obtain shelter and keep the animal warm.

If he is strong and in good condition, give a purgative followed by tonics.

Skin-disease.

Skin-disease in the camel is the bane of Veterinary Surgeons and Transport Officers on Field Service, where it invariably appears both in parasitic and non-parasitic forms.

To keep a camel's skin healthy, it is necessary to take precautions at least once a year. The usual treatment is to give three doses of a quart of linseed or other nutritive oil at intervals of one or two days in the month of March, when the new coat is coming on.

Precautions against skin-disease.

This acts as a tonic and helps the intestines to pass off impurities from the blood.

The body is also thoroughly rubbed with mustard or tara meera oil. If the animal has a thick coat, it is first clipped off. Two applications of oil are made on the body.

With the above precautions, followed up by good grazing and generally healthy surroundings, skin-disease can be kept away during the summer months.

This treatment, however, means that about two gallons of oil will be required for the external and internal treatment of each camel. If we have ten thousand camels on an expedition, we want, simply as a precautionary measure in the spring, twenty thousand gallons of oil weighing ten pounds a gallon, *i. e.*, two thousand five hundred maunds of oil.

Treatment of skin-disease on service.

If we do not take this precaution, it is almost certain that skin-disease will be established among our camels, and then we shall want a still larger supply of oil, as no efficient mange dressing for camels has yet been found which has not oil for its base.

Where is all this oil to be got on field service? This is a difficulty which is discussed in Steel, pages 97 to 100, where the views of Major C. H. Elliot, late Assistant Commissary General for Transport, are propounded.

Eczema in the camel.

Eczema, or non-parasitic skin-disease, is generally attributed to dry indigestible food and exposure.

The hair falls off the legs, flanks, and chest; an eruption breaks out in patches on the skin, which becomes irritated and thickened. The camel falls off in condition and becomes quite unfit for work.

The ordinary mange dressing prescribed for mules and ponies is of great use in this disease. The other treatment consists in change of food and laxative medicine, followed by tonics. Good grazing is of great importance. Camels

Special Diseases of the Bullock.

when bought for field service have not, as a rule, been accustomed to dry food and confinement, and this, as much as anything, brings on eczema.

True mange in the camel.

Parasitic skin-disease or true mange is highly infectious and is due to the presence of the mange insect in the skin.

The hair falls off and pustules and scabs form on the skin. There is extreme itching.

All precautions as detailed for the mule and pony should be taken to prevent the disease spreading.

The treatment consists in washing the skin and applying mange dressing (page 100), the applications being continued until the skin begins to heal. Laxative medicine and green food should be given.

The strength should be kept up with balls of flour and ghee, and sulphur and nitre may be given internally.

Sulphur sublimate	1 ounce	Daily for a week.
Nitre	1 „	

Saddle galls.

Saddle galls in the camel, their causes, prevention and cure, are fully described by Steel, pages 106 to 110.

(*a*) The two chief causes are altered shape caused by emaciation from service exigencies.

(*b*) Bad fitting saddles and neglect of necessary repairs when required.

Saddle galls, if neglected, become very severe. There is great suppuration and infiltration of pus into the surrounding tissues.

Treatment consists in cleanliness, opening of sinuses, or making depending orifices for the escape of pus. Antiseptic dressings as used for the mule or pony. Sluggish wounds must be stimulated by blistering round them.

Special Diseases of the Bullocks.

Pleuro-pneumonia in the bullock.

Pleuro-pneumonia (Infectious Inflammation of the Lungs). This disease is described by Ryland, page 149.

It attacks horned cattle only.

The symptoms are those of strong fever. There is a frequent cough, and the pulse and breathing are much quickened. There is generally slight diarrhœa.

Great pain is shown if the ribs are pressed.

Treatment is of little avail.

Keep the animal warm, take immediate precautions against infection, and consult a Veterinary Surgeon as soon as possible.

Rinderpest.

Rinderpest is a highly infectious and contagious fever which affects horned cattle. It is described in Ryland, pages 146 and 147. It is due to a poisoned condition of the blood.

The disease is characterised by its extreme fatality from lung complications. The symptoms are similar to those of pleuro-pneumonia.

In case of an outbreak, adopt all precautions as indicated for contagious diseases. The disease is incurable, and it is for a Veterinary Surgeon to decide whether it has been established, in which case all affected animals should be destroyed.

Foot-and-mouth disease is an eruptive and contagious fever resulting in sores in the mouth and between the claws of the feet. The temperature is high, food is refused, and the intestines are constipated. The animal grinds its teeth, and there is a copious flow of saliva from the mouth.

Foot-and-mouth disease.

After two days the sores break out, those in the mouth being about the size of a shilling; and these often unite producing sloughs the size of the palm of the hand. The lesions of the feet are preceded by pain, the animal frequently lifting and shaking its feet. The coronet swells and painful sores, causing lameness, break out between the claws. The fever will now subside, and most of the irritation and pain will cease.

Treatment.—Isolate suspected cases and take all precautions against the spread of infection. Give diaphoretics and a laxative dose. Keep up the strength with tender green grass and soft mashes. If there is much weakness, give a diffusible stimulant. Wash the mouth out with alum lotion twice daily and treat the sores on the feet with antiseptic dressing. Give plenty of bedding. When convalescent, tonics may be given.

Foot-and-mouth disease in the camel.

In the camel this disease is almost the same as in the bullock, and similar treatment is required. (See Steel, page 52.)

Impaction of the rumen is caused by the animal eating large quantities of dry indigestible food or from a surfeit of grain or green grass. Old bhúsa is often the cause in India.

Impaction of the rumen.

Symptoms.—Swelling on the left side of the abdomen. The intestines are constipated. There is great pain if the left side is pressed. The head is protruded forward and the back arched.

This is a dangerous disease, and a Veterinary Surgeon should be called in as soon as possible. In the mean time give a dose of linseed oil and a diffusible stimulant.

The following *paras.* from Section V of the Poona Depôt Standing Orders give further rules regarding Sick Lines :—

Para. 4.

Whenever an animal is brought in seriously ill, the Warrant Officer in charge or, in his absence, the Orderly Warrant or Non-Commissioned Officer will address the Veterinary Surgeon direct and ask him to visit the case as soon as possible, informing the Transport Officer at the same time.

Para. 5.

None but intelligent and hard-working drivers are to be detailed as assistants in the sick stables.

Para. 6.

One night sentry is required for the sick lines. If the number of drivers in the sick lines is not sufficient to furnish sentries, they will be provided from the Bearer Column. The salútri will visit the sick lines every night after 11 p.m. If there are two salútris, they will visit the lines on alternate nights.

Monthly indents for bazaar medicines and sick stable contingencies will be preferred in advance on the 25th of each month and complied with on the 1st of the month following, except for articles urgently required, which may be obtained at once from the proper sources.

Para. 7.

Para. 2017, Vol. V, authorizes a lantern and oil for night use in transport infirmaries.

Paras. 1940 to 1952, Vol. V, give the rules under which medicines can be obtained.

Appendices 41 and 42, Vol. V, give the medicines, veterinary instruments, and necessaries allowed for Depôt and Regimental Transport in peace-time, but on field service each Brigade Transport Officer is supplied with a pair of field veterinary medical chests for the treatment of trivial cases of sickness and injuries amongst transport animals which the Veterinary Surgeon may not deem it necessary to take into hospital. These chests contain necessaries, instruments, medicines, etc., as shewn in Appendix 52 of the Commissariat Field Service Code. The arrangements for the reception and treatment of sick transport animals on the field are laid down in paras. 615—627 of the same Code.

Treatment of sick transport animals on field service.

LECTURE XII.

Forage used for Indian Transport Animals—Description of. How supplied. Feeding Rules. Rules for Casting Transport Animals.

[NOTE.—To illustrate this lecture we require—

Good, medium, and indifferent samples of each of the various articles of forage as detailed in the lecture.

Weevil-eaten samples of grain.—A chaff-cutter and grain-crusher to explain the method of adjusting and working the machines.

Vol. V, A. R. I., and Field Service Commissariat Code. Commissariat Transport Form No. 2.]

The following articles of forage are used for transport animals in different parts of India :—

Oats.	Bhoosa (missa)—(pods and stalks of gram and varieties of dhál.)
Barley.	Karbi, or charri—(stalks of jowári or bájri.)
Gram (Channa).	Maccai—(stalks of maize.)
Kúlthi.	Green wheat } (Kasíl.)
Maize.	,, barley }
Rice.	Green grass.
Bran.	Lucerne grass.
Linseed.	Guinea grass.
Hay.	Carrots.
Bhoosa (barley).	
,, (wheat).	

Composition of food. All foods are composed of—

(*a*) Albuminous matters—"Flesh-formers."

(*b*) Starch, sugar and fat—"Heat and fat producers."

(*c*) Mineral matters (alkaline and acid).

(*d*) Water.

(*e*) Indigestible fibre.

Flesh-formers. The flesh-formers are utilised in building up the various muscles and tissues of the body, including the skin, hair, and hoofs.

Heat & fat producers. The heat and fat producers, as the term implies, keep up the heat of the body and secrete a supply of fat.

Ideal proposition of nourishment. For ordinary work the most suitable proportion of flesh-formers and heat and fat producers would be in 100 lbs. of food—

Flesh formers	10·6 lbs.
Heat and fat producers	56 ,,

Oats are the nearest approach to this, and are consequently considered to be the most digestible and suitable grain for ordinary purposes.

Oats most suitable for feeding

FORAGE.

Nutritive properties of various foods.

The nutritive properties of the other foods are approximately as shown in the following table :—

In 100 lbs. of food.

	Flesh formers.	Heat and Fat producers.
	lbs.	lbs.
Oats	12	66
Barley	9½	69
Gram	19½	67
Kulthi	23	63
Maize...	10	75
Rice	7½	77
Bran	14	54
Linseed	21	55
Hay	8	43
Bhoosa (barley)	3	34
„ (wheat)	2	32
Green grass (before flowering) ...	3	13½
„ „ (after „) ...	2⅔	16
Lucerne (very young)	4⅓	8½
„ (in blossom)	4½	7·7
Carrots	1½	11

New grain unsuitable.

The harvest time of most of the Indian grains is in the spring.

They should not be used for feeding animals until they are at least six months old, as new grain contains an excess of moisture and is not so easily assimilated as when it is matured. Frequently, however, owing to exhaustion of local stocks, newly-harvested grain has to be used. Maize is generally harvested about November.

Weevils in grain.

In India, owing to want of suitable granaries, grain is frequently weevil-eaten. The weevil makes a hole in the grain and then proceeds to damage the contents, reducing what it does not eat to a fine flour. Grain thus eaten deteriorates in nutritive value. As weevils are so common in this country, we must be prepared to accept a certain proportion of weevil-eaten grain, especially just before the harvest, when other stocks are exhausted. Discretion must however be used, and when the grain is badly damaged, it must be picked over, all the very light grain being removed.

Grain to be crushed.

All grain should be well crushed before it is given to animals.

Mere splitting is not sufficient. This has already been referred to under Stable management.

Well-broken grain cannot easily be swallowed without being first well masticated by the teeth.

Soaking not necessary

There seems to be no necessity for soaking grain for any of our transport animals, provided it is well crushed, kulthi being the exception.

Dry grain easily digested.

The digestive juices can work more powerfully on unsoaked grain, as they are diluted and weakened by the water taken up while the grain is soaking.

Chaff.

Dry grain also promotes an increased secretion of saliva, which is very necessary for digestion.

As a further precaution against grain being taken into the stomach before being properly masticated, we mix bruised straw or chaff with it. This also gives bulk to the grain and enables the stomach to perform digestion more effectually.

Chaff should be damped.

The chaff should be damped for two reasons—

1*st.*—As Indian hay is very hard and brittle, the sharp ends of the chaff might irritate the mouth and throat.

2*nd.*—The pieces of dry grain attach themselves to the damp chaff, and the animal is consequently unable to pick out the grain and leave the chaff.

About one pound of chaff or bhúsa in each feed is sufficient. When crushed grain is not procurable on field service, it can be given soaked. One and a half hours' soaking for gram, and three hours for barley and maize. They double their dry weight in this time. Mix plenty of dry bhúsa with the soaked feeds. A ready method for soaking grain is to dig a shallow hole and place a tarpaulin in it, then pour in the grain and add water.

Soaking grain when necessary.

Animals with decayed teeth, which interfere with proper mastication, should have their grain soaked.

Oats are grown extensively in the North-West Provinces and the Punjab, and are sometimes issued to transport animals as being the cheapest grain locally procurable. The Indian oat is not the full plump grain which is produced in England and Scotland.

Oats.

Oats which have a musty or mouldy smell should not be used for food.

Good oats have a sound sweetish taste when crushed between the teeth. Bad oats will have a rank mouldy taste.

Barley is very generally used in Eastern countries for feeding animals. Good Indian barley is a full plump grain with a bright colour and clean taste. It has a very thick tough husk, and, if given uncrushed, is likely to cause irritation of the intestines.

Barley.

Gram (chenna) is very generally used in India. The best quality is light coloured and the grains are large and plump. A fair sample of gram will contain a certain proportion of black shrivelled grains. Gram contains an excess of flesh-forming matter, and for this reason cannot be looked on as an ideal food. It does very well however, provided that the animal has regular work.

Gram.

(Vol. V, para. 1922.) In Bengal 2nd sort gram is issued to transport animals. In 2nd sort gram, 4 lbs. of foreign grain is allowed to the maund. **Gravel and dirt are hurtful to the animals, and gram containing these matters should not be issued.**

2nd sort gram.

Kúlthi is a brown grain something like linseed in appearance, but much harder

Kúlthi.

It is used in Madras for the feed of Government animals. It is always given boiled, as it is a very hard grain and cannot be properly assimilated in its raw state, even when finely ground. It contains an excess of flesh-forming matter. When thoroughly boiled it is a good food for weakly animals as it is easily digested. The soup which is drawn off from boiled kúlthi when strained and cleared of grit and dirt is very nourishing for sick and weakly animals. They can soon be induced to drink it if salt is added.

The great objection to the use of kúlthi is that animals which have been fed on this boiled food do not thrive when moved away to other districts where they are fed on grain which is given raw.

Moreover cooked food is generally acknowledged to be unsuitable as a constant diet for healthy animals, as the large quantity of moisture taken with the grain dilutes and weakens the action of the digestive juices. Well-boiled kúlthi increases its dry weight by two and a half times.

Cooked food.

Maize when well crushed is a useful food. It has however an excess of fat and heat producers. Good maize is light coloured with large full grains. Inferior maize has an undue proportion of shrivelled and dark-coloured grains.

Maize.

Rice is given to transport animals in Burmah and Assam. It is a good food when well crushed and mixed with equal parts of gram. The percentage of flesh-forming matters in this mixture is 13½ and of heat and fat producers 74 ; this latter is rather in excess of the requisite amount, but the former is very nearly the same as in oats.

Rice, paddy or dhan.

Bran is the thin shell or envelope of the wheat grain.

Bran.

Its nutritive powers depend on the perfection or otherwise of the process of grinding. The bran from machine-ground wheat is wanting in feeding properties, but is useful as a laxative. Bran from hand-ground wheat has generally a large proportion of flour in it. In India bran will not keep long ; it soon becomes caked and musty and unfit for food. It is not a good food by itself, but is useful with gram or barley.

Linseed, owing to its high cost, cannot be looked upon as a ration grain, but only as a medicinal adjunct for sick animals. It has already been dealt with in a previous lecture (page 93).

Linseed.

Indian hay, if well saved, has a good deal of nutriment in it. The descriptions of grasses vary greatly throughout India.

Indian hay.

Owing to the dry heat of the climate, it becomes very brittle and does not present the compact form of English hay.

There are considerable difficulties connected with the proper harvesting of hay in India. The grass should be cut just after it has flowered, which in most parts of India is about the beginning of September. But just at this time we generally get heavy rain and there is great danger of the crop being injured. The natives are not accustomed to cut their grass until after they have harvested their monsoon crops and sown

their winter crops, and it is of course very difficult to get them to alter their habits. Something, however, has been done by importing hay-mowers, horse rakes, and elevators for cutting and stacking the grass on Government lands, and with these machines the risk of injury from rain has been materially lessened. Grass, which is not cut until November or December, when the weather has settled, is generally brittle and dries up very quickly under the hot sun. Good Indian hay should be of a light colour tinged with green and should have a sweet scent. The stems should not be too thick, and there should be a certain amount of leaf. Grasses with fluffy flowers are of inferior quality. The ripe flowers of most good grasses contain well-developed grain.

Many Indian grasses contain an aromatic oil which gives off a strong lemon-scented odour when the grass is bruised by rubbing it in the hands. This oil is sometimes objected to by persons unacquainted with its properties, but, far from being injurious, it has a tonic effect and stimulates the appetite. It also acts beneficially on the skin and kidneys.

Bhúsa.

Bhúsa, which is the bruised straw of barley or wheat, is a fairly good forage, but is inferior to hay as regards nutritive properties.

Wheat Bhúsa is white, and *Barley Bhúsa* has a yellow tinge.

The latter has superior nutritive properties.

Missa Bhúsa, the pods and stalks of gram and different dhals, is given to camels with an equal portion of wheat or barley bhúsa. New bhúsa is easily digested, but it soon deteriorates. Old bhúsa should be moistened before being given to bullocks ; otherwise it is liable to become caked in the stomach. Bhusa is very useful in giving bulk to the grain ration.

The present pattern of nose bag is made large enough for the animal to eat his bhúsa from it when it is issued as fodder. In this way much waste is saved, as bhúsa spread before an animal is easily blown away by the wind.

Karbi, charri.

Karbi, charri and maccai. The first two are the stalks of jawari and bajri plants, and maccai those of the maize plant. They are good articles of forage, but more suitable for bullocks and camels than for mules and ponies.

There is a good deal of woody fibre about them, which with the latter animals is liable to cause irritation if imperfectly-digested portions pass into the intestines. All karbi should be chopped into lengths of six or eight inches before being put down before the animals. In this way much waste is saved. Chaffed karbi is also very useful for giving bulk to the grain. A prolonged diet of karbi makes mules and ponies foul inside.

Kasil and green grass.

Green wheat and barley (kasíl) *and green grass* are given as they come in season. They have a slight purgative and also a diuretic effect and thus help to clean an animal out after he has been on a long course of dry food. They are not very nutritive, and if an animal gets an excessive amount of green food, he becomes soft. As kasil and green grass are issued in double rations, it would be well to give a half ration both of green and dry food. Thus a mule getting fifteen pounds of hay would under ordinary circumstances receive thirty pounds of kasil as a change

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Kasil and green grass.

of diet, but a better ration would be seven-and-a-half pounds of hay and fifteen pounds of kasil or green grass; the green and dry forage to be given mixed together.

In Southern and Western India green grass is issued in September just before the marching season, and we must be careful not to get our animals too soft, or we shall have collar-galls and sore backs on the march.

Lucerne grass, *guinea grass* and *carrots* are generally given as extra rations to sick and weakly animals under the Veterinary Surgeon's recommendation.

They are tender, appetizing and easily digested.

Scales of rations.—The scales of ordinary rations are given in Vol. V, Appendices 38 and 39, and in Appendix A of this book. The subsidiary instructions entered below the scales should be carefully noted. When animals receive an extra pound of grain under the second and third clauses of Appendix 38, an entry must be made at the bottom of the Monthly Muster Roll to the effect that they were hard-worked.

Scales of forage rations.

Para. 1918, Vol. V, rules that the feed of all Government transport animals is to be issued by English weights (avoirdupois).

Staple grain to be the cheapest locally procurable.

Para. 2050 directs that mules and ponies shall be fed on the cheapest description of suitable grain procurable locally.

Para. 2049 lays down that gram or barley is the staple grain for bullocks.

When gram is not the cheapest description of grain procurable and its issue is considered absolutely necessary to put mules or ponies in good condition or to keep them so, half the grain ration may for a month or more consist of gram, provided the issue is recommended by a Veterinary Surgeon, or in the case of Regimental Transport by the Commanding Officer in consultation with a Veterinary Surgeon when one is available (para. 2041, Vol. V).

Staple grain may be mixed with gram.

Scale of forage on field service.

The scale of rations for field service will be found on page 27 of the Field Service Code. It is very similar to the ordinary command scale.

Supply of forage.

Para. 1800. At stations where the Commissariat Department is represented, all forage for transport animals will be supplied and paid for by the department, but at outstations where there is no Commissariat representative Officers Commanding corps will arrange for the supply of forage for their Regimental Transport under the provisions of para. 1819.

Extra rations.

Paras. 1799 and 1821 refer to the issue of extra rations. With Depôt Transport these extra issues can be sanctioned by the Chief Commissariat Officer, and in the case of Regimental Transport by the Commanding Officer. In either case the period for which extra rations are issued must not exceed one month without the sanction being renewed.

Allowances for cutting forage.

Paras. 1877 and 1878 refer to allowances to drivers for cutting forage for their animals free of charge. Free forage for mules, ponies, and bullocks is not often obtainable, as so many of

the old grass lands have been taken up for cultivation. In thickly-wooded countries free forage is often obtainable for elephants.

Forage on the line of march.

Paras. 2004 to 2007 give the rules for feeding depôt animals on the line of march.

Supervisors on the march.

Paras. 2008 and 2009 lay down the supervising establishment to accompany transport on the march to look after the rationing and general care of the animals.

With reference to the ruling that, if no permanent agent is available, a hired agent is to be sent if the number of animals exceeds a jemadar's charge, we must be very careful to select a trustworthy man. It is difficult to get reliable men to take up a job of this sort. The work is troublesome and there is every opportunity for peculation. If he does starve his animals, it is a matter of considerable difficulty to bring it home to him. Fining him at the end of the march is of very little use, as he will have made so much that he can afford to lose all his pay. A preferable course is to send a departmental non-commissioned officer in charge of the animals, but, if obliged to employ a temporary agent, hold the permanent petty officers jointly responsible for the animal's feeding and condition, and inform the agent of this ; also that any short or inferior issues of forage made by him will be brought to notice by the petty officers.

The permanent petty officer has something to lose, and it is to his interest to see that the animals are properly done.

With reference to the concluding clause of para. 2008, a non-commissioned officer is in the Bombay Presidency always sent on the march with Government animals when their number exceeds fifty.

Foraging Regimental transport on the march.

The feed of regimental transport on the march will be carried out under the provisions of paras. 1819, 1822 and 2004, clause 2.

CASTING RULES.

Casting Rules.

The rules for casting transport animals are found in paras. 1953 and 1961, A. R. I., Vol. V.

Mules and bullocks are cast on the 15th September annually. The members of the Casting Committee are specially selected and are assisted in arriving at their decisions by the Transport Officer and the Veterinary Officer in charge.

The maximum annual castings at each station should not exceed nine per cent. of bullocks and four per cent. of mules.

The proceedings are made out on Commissariat Transport Form No. 21.

The Committee have to certify that the animals cast for various causes are unfit for the purpose for which they are kept up, and that those which are cast for no particular disease, but simply on account of their being old and worn out, are 18 years of age or more.

If the animals cast are not in excess of the authorized percentage, they are to be branded with the letter **R** and sold.

Destruction of valueless cast animals.

If of no value, the animals may be shot in the presence of the Committee after the proceedings have been sanctioned by the Officer Commanding the station. With reference to this

ruling, it is worth noticing that cast animals, which are really of no use, are often sold for small sums varying from five to fifteen rupees. The purchasers calculate that they can get their value out of them, but it generally results in the animal dying after two or three months of slavery and suffering. Transport Officers would therefore be hardly exceeding their duty in recommending to Committees that, in the interests of humanity, all cast animals should be destroyed, which, from impaired constitution or chronic lameness, would not be able to stand rough usage and hard work without severe suffering.

Paras. 1857 and 1858 lay down the procedure to be observed when the castings exceed the authorized percentage.

The provisions of para. 1959 should be carefully noted. Suppose that on the 15th of March it is found that, as the result of hard work during the relief season, several animals are suffering from chronic lameness or debility and have become useless for Government work, it would be waste of money to keep them till the 15th September. This para. therefore provides that such animals should be destroyed under the orders of the Officer Commanding the station, as also all animals which, through accidental injuries or infectious disease, have become unfit for service or sale.

Destruction of valueless animals under order of Officers Commanding Stations.

The best way of destroying a mule or pony is to shoot him with a shot-gun in front of the head just between the roots of the ears. This causes instant death. If a bullet has to be used, the same spot should be selected.

Method of destroying different animals.

To destroy a camel or bullock, shoot it behind the ear. The charge should take a forward direction towards the forehead and will then penetrate the brain.

To kill an Indian elephant, the bullet should be lodged in front of the head in the hollow just above the bump at the base of the trunk. The spot is usually about one foot above the line of the eyes, but this distance varies according to the size of the elephant's head. Be careful to aim above the base of the trunk.

LECTURE XIII.

Transport Establishment. Transport Agents. Artificers. Veterinary Establishments. Petty Officers and Drivers. Their Attestation. Pay. Clothing. Hutting. Discipline. Camp Equipage. Pension Rules.

NOTE.—To illustrate this lecture, the following will be required :—

Attestation form A.
Army Hospital form No. 93.
Volume V, A.R.I.
Commissariat Field Service Code.
Commissariat Transport forms Nos. 3, 7, 8, 9, 10, 11, 12, 13, 18, 19, 20, 28, 32, 33.
Field Service forms 14, 15, 19 and 20.
Followers' Service Book.
Specimen articles of drivers' clothing.
Stencil plate for marking clothing.
Punches for marking leather articles.
Followers' service disc and cord.
Articles of field service clothing.

Transport Agents.

Transport Agents are appointed by the Commissary General of the Circle.

They are not attested, but furnish security as follows (para. 1870, Vol. V) :—

BENGAL AND MADRAS.

	Pay per mensem. Rs.	Security. Rs.
1st Class Agent	50	1,500
2nd do.	40	1,200
3rd do.	30	800

BOMBAY.

2nd Class Agent ...	50	1,000
3rd do. ...	40	700
4th do. ...	30	500

Before entertainment every agent must sign an agreement that he will proceed to any station in or out of India to which he may be ordered (para. 105, Vol. V).

Duties and responsibities of agents.

The duties and responsibilities of Transport Agents are laid down in para. 1787, Vol. V.

It is not intended that an agent should perform all these duties single-handed, and he will, of course, be assisted by the European subordinates, the senior Warrant or Non-Commissioned Officer being responsible to the Transport Officer for the general work of the depôt.

Custody of stores and cash.

The actual safe keeping of all stores and cash is solely entrusted to the agents detailed for those duties, as they furnish security and can be made pecuniarily responsible for any losses. When supplies of forage or stores are made departmentally, the European subordinate and purchasing agent should be made mutually responsible that these stores are of the proper quality required and that the prices paid are reasonable.

If there is any difference of opinion between them on these subjects, it should at once be brought to the notice of the Transport Officer.

Stores and supplies to be inspected by an Officer.

It is safe and satisfactory to make a rule that no supplies or stores should be taken on the books without first being inspected by the Transport Officer.

Practical training of Agents.

It is most essential that Transport Agents should be trained in the practical work of fitting saddlery and packing and loading, also in the care and management of animals in cantonments and on the march. **Without practical knowledge on these points they are utterly unfit to take charge of transport animals.**

Artificers and salútris.

Artificers and salútris are entertained by Commissariat Transport Officers in charge of head-quarters or outpost stations.

They are not at present attested, but sign an agreement for general service. When appointing them, it is best to take them on probation for three months, and if they do not give satisfaction, they can then be discharged ; otherwise you may find yourself with an unsatisfactory man on your hands whom it is difficult to get rid of. The duties of artificers, lists of tools, etc., will be dealt with in a future lecture under the head of " Repairs."

Salútris.

Salútris and their duties have already been discussed.

Some of them are idle and ignorant, and their pay admits of excessive indulgence in opium and liquor. Others are, however, intelligent, sober, hard-working men.

Pay and position of salútris.

The present monthly pay of a salútri (Rs. 30 in Bengal and Madras and Rs. 25 in Bombay) is not sufficient to attract a good class of qualified men, and the subject of increasing the pay and improving the position of transport salútris is now before the Government of India.

If sick animals are to be properly looked after, the salútris in charge of transport infirmaries must be sober, intelligent, hard-working and methodical, and moreover competent to discipline and control the drivers attached to the sick lines.

Jemadárs, Drivers and Duffadárs.

Jemadárs, duffadárs and drivers are attested under the Indian Articles of War and are subject to military discipline.

In the first instance it is best to take candidates on a month's probation.

Probation.

Many men join with the idea that there is not much to do and plenty of money to be made out of the animals. As soon as they find out their mistake, they desert, and if they have already been attested, there is all the trouble of catching and punishing them.

After a month's satisfactory probation, the candidate for employment can be attested at the monthly muster parade or the weekly inspection, when the following declaration is read in the vernacular prior to attestation:—"In time of peace, after you have served the period for which you now attest, or during that period, you may claim your discharge through the medium of the Commissariat or Regimental Transport Officer under whom you are serving, and it will be granted to you within one month from the date of your application, provided that it will not cause the

Attestation.

driver establishment to be 5 per cent. below its full complement, in which case you will be required to remain in the service until that objection is removed or is waived by competent authority. But in time of war, or exceptional sickness, or when war is imminent, you will have no claim to such discharge and you will have to remain and do your duty until such necessity for retaining you in the service shall cease.

" If, on the completion of the period for which you will now attest, you re-enlist, your service in the department up to date of re-enlistment will count for pension ; but if you take your discharge and then re-enlist, you will have no claim to reckon your service previous to such discharge."

After the above declaration has been read, the attestation is completed by the man, after being solemnly affirmed or sworn, repeating the agreement contained in attestation form A, which is filled in in duplicate and signed by the recruit, the attesting officer, and two witnesses. One copy will be pasted in the recruit's service book and the other retained permanently in a guard book in the office of the Chief Commissariat Officer of the Command.

During a driver's future service all questions relating only to his attestation will be referred to the Chief Commissariat Officer of the Command in which he was originally attested (Commissary-General-in-Chief's No. 329-T of 23rd June 1888).

Age of enlistment.

No man is to be attested who is under 18 or over 25 years unless he has previously served in the Commissariat Transport Department and can show a discharge certificate, when he may be re-engaged up to the age of 30, but his previous service does not count for pension.

This rule is made with a view to prevent men of 35 or 40 engaging and serving on for pension until they are quite old and useless.

(Para. 1856, Vol. V.) Vacancies of drivers in regiments are filled up by sending trained men from depôts.

Old soldiers as jemadárs and duffadárs.

Para. 1856 permits of old soldiers being engaged as jemadárs or duffadárs up to 40 years of age. This might answer when engaging men in a hurry for field service, but for Depôt and Regimental Transport it is better to fill up vacancies from the permanent drivers and thus induce good men to join with a view to obtaining promotion.

Medical examination and certificate.

Before being attested, every man must be medically examined, also before proceeding on field service, when Army Hospital Form No. 93 will be filled in by the Medical Officer and pasted on page 14 of the Service Book (Commissariat F. S. Code para. 119). Under present arrangements drivers temporarily entertained for field service are not attested, but on service they come under the Indian Articles of War as camp followers.

Temporary establishments for field service.

Caution against bad characters.

If placed in charge of drivers temporarily entertained for field service, you will find that many of them are loafers who have joined with the idea of drawing their clothing, rations and pay and of doing as little work as possible in return. To get them into shape, good jemadárs and duffadárs are required. Many of these, if newly entertained, you will find to be

plausible frauds who have joined with a view to making profits by stealing their animal's food, extorting money from the drivers, selling them opium, and buying their clothing and rations for re-sale at a profit. They are sometimes old soldiers (who have taken their discharge, finding regiments too hot to hold them,) and occasionally old jail-birds. The former you will know by his military salute and jaunty appearance; the latter by his specious words and crafty looks.

Beware also of the Transport Agent if he has been newly entertained for field service. As likely as not, he has joined with the same benevolent intentions as the jemadár and duffadár frauds, and they will most likely work in conjunction. Give them rope and watch them, and if your suspicions are correct, they will very soon betray themselves, as they are greedy and will commence operations as soon as possible. If they are caught tripping, the Provost Marshal and his assistants will provide the arena and appliances for the conclusion of the episode, and others will be deterred from following similar nefarious courses.

If it falls to your duty to entertain establishments for field service, be forewarned and be sure that you get good jemadárs and duffadárs.

We can only hope that, in detailing supervising Non-Commissioned Officers for general transport work on Field Service, Commanding Officers will realise that these men will be placed in very responsible positions and that they will select only those who are intelligent, sober and trustworthy.

Descriptive roll of establishment.

Para. 1866 provides for a descriptive roll of all transport followers. (Commissariat Form No. 18.) This is an important record for tracing men's service for pension and should be most carefully kept up. The attestation number and date should be entered and the special marks carefully noted and intelligently entered.

(Para. 1867.) A descriptive roll of transport followers is also kept up by Regimental Transport Officers, and this will be examined and reported on by Inspecting Commissariat Transport Officers.

Precautions for identification on field service.

The instructions of Section V, Commissariat Field Service Code, must be carefully carried out whenever permanent or temporary followers are sent on field service. This section deals with the precautions necessary for future identification in cases of death or loss of service books.

Monthly muster.

Para. 1915, Vol. V, provides for the monthly muster of all transport animals and establishments.

Muster rolls.

(Para. 1797.) Monthly muster rolls of all animals are kept up on Commissariat Transport Forms 7, 8, 9, 10, 11 and 12. They are filled in daily, totalled at the end of the month and signed by the Mustering Officer. These rolls are the vouchers to support the pay of establishments and cost of feeding the animals. Notes for guidance are printed on these forms, also a pay bill and a condensed statement of rations issued (see also para. 1828).

(Para. 1882.) Jemadárs and duffadárs are not to be reduced in consequence of the temporary reduction in the number of animals under their charge, nor is their pay to be decreased.

Documents on transfer of establishment.

Para. 1829 gives the documents to go with men on transfer from one station or depôt to another, *viz.* :—

Last pay certificate (Commissariat Transport Form 28).

Extract from Descriptive Register (Commissariat Transport Form 18).

Service Book.

A Service Book is kept for every transport follower. It is always to be in his possession except for the short time required for making entries of payments, promotions, punishments, etc. (*vide* note to clause V of para. 1787, Vol. V).

Followers' Service Book.

Followers should be encouraged to keep their books in tin cases to prevent them becoming soiled and damaged.

In some stations these are provided under departmental arrangements, and followers are glad to pay for them, as they recognise that their books are of value to them, and moreover a charge of one rupee is levied on a new book if the old one has been damaged or lost through the man's carelessness (Commissariat Field Service Code, para. 938).

A flat tin case $2\frac{1}{2}'' \times \frac{3}{4}'' \times 7''$ with a cover can be made for about two annas and will hold the man's service book and characters.

It would be well if a tin case of this sort was provided with the service book, as it would save much wear and tear.

(NOTE.—Here read and explain the instructions on the fly leaf of the service book.)

Pages 2 and 3 contain the man's descriptive roll, and the entries should be clearly and neatly entered.

The remarks at the bottom of page 3 are only entered when the man takes his discharge or is dismissed. All alterations in rank or number on page 1 should be initialled by an officer.

On pages 4, 5, 6, and 7 are entered the man's qualifications, also instances of serious misconduct.

The following specimens of favorable entries may be taken as a guide.

For Drivers.

"Well behaved and hard working ; gives no trouble."

"Clean and tidy ; turns out his animals and harness well at inspections."

"A good hand with young or troublesome animals ; understands breaking animals to draught."

"Brought his animals and harness back in good condition when detached on command."

"A good cart driver ; manages his animals well."

For a Petty Officer.

"Attentive, hard-working and reliable."

"Animals and gear in good condition. His troop turns out well at inspections."

"Active and smart in his personal appearance, and imparts smartness to his drivers."

"Manages his drivers well. The men of his troop do their work well and give no trouble."

"Can be trusted to take proper care of his animals and gear on command."

"Can give good instruction in fitting saddlery and driving."

Native Establishments.

In the Bombay Presidency the issues of peace-time clothing are, under instructions from the Commissary General, entered on page 7 in the following form :—

Date of Issue.	Blouse.	Pugri.	Shoes.	Belt.		Signature of Officer.
1st April 1888 ...	1	1	1	1		A. B., Lt., D.A.C.G.
1st April 1889 ...	...	1	1	...		C. D., Lt., T. O., Royal Fusiliers.
1st April 1890 ...	1	1	1	...		

On pages 8 to 13 the man's services are recorded. All changes of stations, promotions, reductions, etc., must be noted.

On page 14 the result of the medical examinaton for Field Service is recorded.

The field service issue of clothing is entered on page 15 ; also the tools artificers take with them on service.

In Cantonments payments are not entered in the Followers' Book, but on field service all payments must be entered ; pages 16 to 25 are reserved for this purpose.

All entries should be neatly made in ink, or with an indelible pencil on field service. They should not be scrawled across the page as is sometimes done.

Scale of establishments.

The peace and war establishments for stated numbers of animals are as follow (para. 1852, Vol. V) :—

Details of Establishments.	Pack Mules or Ponies.	Donkeys.	Pack Bullocks.	Camels.	A. T. Carts with Bullocks or Mules.
	1,000 animals.	2,000 animals.	1,000 animals.	500 animals.	250 carts, 500 bullocks or mules.
Driver Establishment—					
Jemadárs	20	20	10	5	5
Duffadárs	40	40	20	10	10
Drivers	(*a*) 366	(*b*) 440	(*b*) 220	(*a*) 184	(*c*) 275
Veterinary Establishment—					
Salútris	4	.....	4	1	3
Shoeing-smiths	(*d*) 2	.....	2	.....	4
Artificers—					
Saddles	12	20	12	.....	(*e*)
Palan (Camel saddle) makers ...	.....	.....	.....	5	.....
Carpenters...	2	.....	2	.....	3
Blacksmiths	4	.....	4	.....	2
Hammermen	4	.....	4	.....	2
Bellowsmen	4	.....	4	.....	2
Agent's Establishment—					
Peons	2	2	2	1	2
Weighmen...	2	.....	2	2	2
Supervising Staff...					

(*a*) One to every three animals with 10 per cent. to spare.

(*b*) Do. do. five do. do.

(*c*) Do. to each cart with 10 per cent. spare.

(*d*) For ponies, two extra shoeing-smiths to every 1,000 animals.

(*e*) When Army Transport carts are drawn by mules or ponies, 10 native saddles per division of carts are allowed.

Native Establishments.

Pay.—The pay of different classes of Transport Establishment is as follows (para. 1869, Vol. V) :—

Class of Establishment.	Bengal, per mensem.	Madras, per mensem.	Bombay, per mensem.	Burma, per mensem.
	Rs.	Rs.	Rs.	Rs.
Elephant ... ... 1 Jemadár to every 20 elephants or for any less number exceeding 10(*a*)	10	10	10	20
1 Mahout to each elephant	8	8	8	12
1 Coolie do. do.	5	5	5	9
Pack Mule or Pony ... 1 Jemadár to 20 animals	10	10	10	(*b*) 10
1 Duffadár to 25 do.	8	8	8	(*b*) 8
1 Driver to 3 do.	6	6	6	(*b*) 6
Pack Bullock ... ... 1 Jemadár to 100 animals	9	9	10	15
1 Duffadár to 50 do.	7	7	8	10½
1 Driver to 5 do.	5	5	(*c*) 6	9
Donkey ... ... 1 Jemadár to 100 animals ...	10	10	10	...
1 Duffadár to 50 do.	8	8	8	...
1 Driver to 5 do.	6	6	6	...
Camel ... ... 1 Jemadár to 100 animals	10	10	10	(*b*) 10
1 Duffadár to 50 do.	8	8	8	(*b*) 8
1 Surwan to 3 do.	6	6	(*c*) 6	(*b*) 6
Draught Mule or Pony 1 Jemadár to 100 animals	10	10	10	...
1 Duffadár to 50 do.	8	8	8	...
1 Driver to each Army Transport cart..	6	6	(*c*) 6	...
Draught Bullock ... 1 Jemadár to 100 animals	9	9	10	15
1 Duffadár to 50 do.	7	7	8	10½
1 Driver to each Army Transport cart.	5	5	6	9
Siege Train Bullock ... Duffadárs { 1 for 42 to 62 bullocks. 2 „ 63 to 104 do. 3 „ 105 to 167(*e*) do. }	7	7	8	10½
1 Driver to 2 bullocks	5	5	6	9
Veterinary ... ... Salútri	30	30	25	45
Shoeing-smith	15	15	20	(*f*) 22½
Artificers ... ... Blacksmith	12	12	25	(*f*) 18
Saddler (native), including camel saddle (palan) maker...	10	10	15	(*f*) 15
Carpenter	10	10	25	(*f*) 15
Hammersman	7	7	10	(*f*) 10½
Bellowsman	6	6	6	(*f*) 9
Assam Transport Corps of Porters. 1 Sirdar to 50 porters	(*f*) 14	...	...	...
1 Mate to 25 do.	(*g*) 12	...	...	...
1 Porter	(*g*) 10	...	...	...
Ambulance-bearers (*h*) { Sirdar, Mate, Bearer } *vide* para. 2102	7 / 6 / 5	8 / 7 / 6	8 / 7 / 6	12 / 10½ / 9
Cattle Agents... ... Weighman	5	5	6	7½
Peon	6	6	6	9

Transport establishments in the Quetta District receive special rates of pay, which are revised under Government sanction from time to time.

(*a*) For from 30 to 40 elephants, 2 jemadárs; 50 to 60 elephants, 3 jemadárs; and so on.

(*b*) With one-eighth batta and rations in addition.

(*c*) In Sindh, drivers of mules, ponies or pack bullocks receive Rs. 7 per month.

(*d*) When siege train bullocks are employed in Army Transport carts, the scale of establishment given in para. 1852 for Army Transport will be allowed (Government of India M. D. No. 465 S. D. of 29th May 1863).

(*e*) Above 167 bullocks, in the proportion of one additional duffadár to every 42 bullocks.

(*f*) Including foreign allowance.

(*g*) Including all allowances, such as Assam batta, field batta, &c.

(*h*) Sirdars, mates, and bearers serving in the Sind District receive respectively Rs. 8 and Rs. 7 per man per mensem, and those serving in the Punjab Frontier Force and in the Peshawar Valley receive respectively Rs. 8, 7, and 6 per man per mensem.

Field service pay.

The rates of field service pay are laid down in the Commissariat Field Service Code, section IV, paras. 93 to 97, and Appendix 12.

These rates are in nearly every instance the ordinary pay plus 50 per cent. field batta, which is not however given unless the special sanction of Government has been obtained.

Marching batta.

Ordinary marching batta at one rupee per month is granted to salutris, petty officers, and drivers under the conditions laid down in Vol. V, paras. 173, 174, 175 and 176.

Batta to agents.

In accordance with paras. 167 and 172, Vol. V, transport agents are allowed batta at the rate of 50 per cent. of their permanent pay when proceeding in charge of Government transport or on other commands.

Hill batta.

Hill batta to salutris, petty officers, and drivers at one rupee per mensem is allowed under the provisions of para. 177, Vol. V.

Advances of pay.

Paras. 185 and 1875, Vol. V, give the rules under which advances of pay can be made.

Grain compensation.

Compensation for dearness of provisions is calculated as follows :—

Computation.

The ordinary daily ration consumed by a native follower is supposed to be—

Grain	...	...	...	...	1½ lbs.
Dhal	...	...	...	...	4 oz.
Ghee	...	...	...	...	1 oz.
Salt	...	...	...	...	⅔ oz.

When the cost of this ration exceeds two rupees eight annas eight pies per mensem, the excess is paid by Government to the follower.

In Bengal and Madras grain compensation is only allowed to men drawing less than ten rupees per mensen. In Bombay it is allowed to transport establishments drawing less then thirty rupees per mensem, provided they were entertained prior to the 21st of August 1879. For men engaged on and after that date the privilege is only allowed, provided they are in receipt of less than sixteen rupees permanent pay (paras. 575 and 576, Vol. V).

Pay and grain compensation for establishments with Regimental Transport is drawn under paras. 1823 and 1826, Vol. V.

Rules for payment.

Rules for payment of transport establishments in peace-time are detailed in paras. 1800 and 1874, Vol. V, and must be carefully observed.

Whenever possible, an officer should be present, so that any man who is dissatisfied can have his grievance enquired into on the spot.

Acquittance Rolls (Commissariat Transport Form) must be carefully preserved as they are of great use in verifying services for pension.

Payments on field service.

For rules for payment of transport establishments on field service, see section VIII of the Commissariat Field Service Code.

Remittances from field service.

Followers' remittances on field service can be made through the Post Office (vide paras. 124 and 125, Commissariat Field Service Code).

Clothing. *Clothing* (Vol. V, paras. 1888, 1889, 1891, 1892).

Allowance. The clothing allowed to transport establishments is—

One khaki drill blouse every two years.

One leather belt with buckle every six years.

One khaki puggree (with a distinguishing piece of red cloth sewn on at one end for jemadars, duffadars, salutris and artificers) every year.

One pair of shoes (hob-nailed) every year.

It is, of course, very difficult to keep the men tidy with such a small allowance of clothing. The blouses when issued do not, as a rule, fit the men in the points of length, size of neck and length of sleeves and require alteration.

Repairs and alterations to clothing. The second clause of para. 1888 directs that the clothing is to be kept in repair by the men themselves. This is, of course, hopeless if left to individual men, and in regiments and depôts it will be advisable to establish a system for repairing and fitting clothing. One or two drivers or ambulance bearers, who can sew neatly can be struck off duty to execute the necessary repairs, the cost of repairing materials, which will be very small, being charged to the men concerned.

In the Bombay Presidency the Commissary General has provided sewing machines for the transport depôts, and condemned articles of hospital clothing and bedding are utilised for transport followers. Blue serge hospital pyjamahs are cut up to make putties—condemned mattress cases make strong pyjamahs, which can be easily dyed—old blankets are quilted and afford good protection to drivers on the march ; they are handed over to, and accounted for by, jemadárs of troops.

Supply of clothing. Clothing for transport establishments is obtained from the supply branch of the Commissariat Department by requisition on Commissariat Transport Form No. 28. Stock is replenished as shown in para. 1889, clause 2.

The following table, supplied by Messrs. Cooper, Allen and Co., Cawnpore, gives the sizes of shoes required for the different sized feet of natives of India—

Length of foot in inches.	Corresponding size of size-stick.	Corresponding size of shoe.
$9\frac{1}{2}''$	No. 2 size.	No. 4 size.
$9\frac{3}{4}''$	„ 3 „	„ 5 „
$10\frac{1}{8}''$	„ 4 „	„ 6 „
$10\frac{1}{2}''$	„ 5 „	„ 7 „
$10\frac{3}{4}''$	„ 6 „	„ 8 „
$11\frac{1}{4}''$	„ 7 „	„ 9 „
$11\frac{1}{2}''$	„ 8 „	„ 10 „
$11\frac{3}{4}''$	„ 9 „	„ 11 „

Field service clothing. When transport establishments proceed on field service, they are allowed extra clothing as shown on page 55 and paras. 318 to 335 of the Commissariat Field Service Code.

Marking clothing. All articles of clothing, on being issued, will be stamped with the date of issue (para. 1889, Vol. V). White silicate paint and one-inch stencil-plate letters are the most suitable materials. If the abbreviated station letters and the man's general number is used, there is a better chance of tracing the clothing in case of theft or loss. Thus $\frac{\text{M. M. 163}}{\frac{4}{92}}$

means that the clothing was issued in April 1892 to a man bearing the Mhar Mir General No. 193.

Puggris and puttoos should be stamped in the middle of the length.

Blouses inside just below the collar.

Pyjamahs inside at the back, below the waist band.

Slings should have the marking punched on the inside wall. Belts should be punched on the inside in the middle of the length; one-third inch letters will be large enough for punching leather work.

As it is impossible to keep up a suitable supply of men on the present terms, the question of improving the condition of transport establishments as regards pay, clothing, and leave is now before the Government of India, and orders on the subject may be shortly expected.

Accommodation for transport establishments is provided under the rules contained in para. 235, Vol. V. With the money allowed in Bengal and Madras (three rupees per man and twelve annas a year for repairs) only the most primitive hutting can be provided. In the Bombay Presidency suitable lines were built about 20 years ago, and hutting funds were kept up by the Commissary General. These lines are now maintained and repaired out of a special annual grant of Rs. 5,000 placed at the disposal of the Commander-in-Chief of the Bombay Army.

Para. 1884, Vol. V. gives the leave rules for transport establishments. These arrangements is now under the consideration of Government.

Petty officers may be granted leave on full pay up to three months, provided their services can be spared. Drivers are only granted leave on their providing an efficient substitute. All men proceeding on leave will be granted leave certificates (Commissariat Transport Form No. 30).

Paras. 1885, 1886, and 1887 deal with the procedure to be adopted in the case of men over-staying their leave.

The leave of transport agents is regulated by paras. 205, 206, 207, 208 and 210, Vol. V.

(Paras. 1882 and 1883, Vol. V.) Promotions amongst depôt transport assistants will be made by the Commissariat Transport officer in immediate charge and recommended to the Chief Commissariat Officer. Merit will be the chief recommendation. If a man proves satisfactory in practice a non-commissioned rank for a month, and if he does not give satisfaction he may revert at the end of that period.

All men promoted to the rank of jemadar and duffadar are required to be able to read and write in some vernacular language. Promotions of regimental transport [illegible] as required by para. 1887, Vol. V.

All promotions or reductions must be entered in the [illegible] Descriptive Register.

means that the clothing was issued in April 1892 to a man bearing the Mían Mír General No. 163.

Puggris and putties should be stamped in the middle of the length.

Blouses inside just below the collar.

Pyjamahs inside at the back, below the waist band.

Marking shoes and belts.

Shoes should have the marking punched on the inside wall. Belts should be punched on the inside in the middle of the length; one-third inch letters will be large enough for punching leather work.

As it is impossible to keep up a suitable supply of men on the present terms, the question of improving the condition of transport establishments as regards pay, clothing, and leave is now before the Government of India, and orders on the subject may be shortly expected.

Hutting for transport establishments.

Accommodation for transport establishments is provided under the rules contained in para. 233, Vol. V. With the money allowed in Bengal and Madras (three rupees per man and twelve annas a year for repairs) only the most primitive hutting can be provided. In the Bombay Presidency suitable lines were built about 20 years ago, and hutting funds were kept up by the Commissary General. These lines are now maintained and repaired out of a special annual grant of Rs. 6,000 placed at the disposal of the Commander-in Chief of the Bombay Army.

Leave to petty officers and drivers.

Para. 1884, Vol. V, gives the leave rules for transport establishments. Their amendment is now under the consideration of Government.

Petty officers may be granted leave on full pay up to three months, provided their services can be spared. Drivers are only granted leave on their providing an efficient substitute. All men proceeding on leave will be granted leave certificates (Commissariat Transport Form No. 32).

Over-staying leave.

Paras. 1885, 1886, and 1887 deal with the procedure to be adopted in the case of men over-staying their leave.

Leave to agents.

The leave of transport agents is regulated by paras. 205, 206, 207, 208 and 210, Vol. V.

Promotions, Depôt.

(Paras. 1882 and 1883, Vol. V.) Promotions amongst depôt transport attendants will be made by the Commissariat Transport Officer in immediate charge and communicated to the Chief Commissariat Officer. Merit will be the chief recommendation. It is always more satisfactory to promote a man temporarily for a month, and if he does not give satisfaction, he can revert at the end of that period.

Promotions on probation.

All men promoted to the rank of jemadar and duffadar are expected to be able to read and write in some vernacular language.

Promotions, Regimental Transport.

Promotions of regimental transport establishments are regulated by para. 1827, Vol. V.

All promotions or reductions must be entered in the men's Service Books and Descriptive Register.

The following extract from Section IX of the Poona Depôt Standing Orders bears on the management and discipline of transport followers :—

Discipline.

Section IX. Discipline of drivers and bearers.

"1. Any follower who wishes to speak to the Transport Officer may do so "by applying through his Jemadár or Sirdár to the "Warrant Officer in charge of the Lines. Should his "Jemadár or Sirdár refuse to comply with his wish, he is "at liberty to address the Transport Officer direct.

"2. As the pay of the drivers is very small, heavy fines should not, as a "rule, be inflicted. Fines of from two to four annas or extra duties for slack-"ness will meet most cases.

"3. While impressing on all concerned the necessity for ready obedience "on the part of the drivers and bearers to all orders given them, it must be "remembered that they are for the most part very ignorant. They receive "small pay for the hard work they perform, and it is difficult to procure suit-"able men. They must not therefore be unnecessarily harassed and must be "treated with consideration and tact. They must not on any account be "struck or abused, and every endeavour consistent with discipline must be "made to keep them contented.

"4. When drivers return to the lines after long hours of work, jemadárs "and duffadárs should avoid shouting at or worrying them. They should see "that the animals are properly done, but should at the same time remember "that a tired and hungry man is very liable to give an intemperate answer "or retort if he is unnecessarily worried.

"5. If jemadárs and duffadárs use proper discretion, instances of insub-"ordination will be seldom met with, but at the same time any man who "is idle or deliberately insubordinate must be reported and brought before "the Transport Officer."

Ordinary offences.

The ordinary offences of drivers are carelessness and neglect of their animals and insolence to superiors, which is often provoked by jemadárs and duffadárs abusing and unnecessarily worrying the men.

Petty officers have certainly plenty to do and have heavy responsibilities.

Petty officers and their responsibility.

A jemadar in the draught mule establishment on Rs. 10 per mensem has in his charge animals, carts, and equipment to the value of about Rs. 40,000, and he is held responsible for the general efficiency of this valuable establishment. His drivers are often lazy, and it is difficult to get work properly done.

His proper course, however, is to bring up lazy men for punishment instead of resorting to abuse and entering into altercations with them.

Punishments by Transport Officers and Regimental Commanding Officers.

The following punishments can be awarded by Transport Officers in charge of Depôts and Regimental Commanding Officers (para. 1827) :—

Fines not exceeding one-fourth of the monthly pay. Reduction of rank, either permanent or temporary.

Discharge.

Appointment to draught troops is generally looked upon as a privilege, and may be held out as a reward to good pack drivers. Slack, untidy cart drivers can be punished by reverting them to pack-work.

In time of peace the more serious offences of attested men can be dealt with under the Indian Articles of War, but on field service all followers come under these articles.

Defaulters' book for depôts and regiments.

All punishments awarded to transport followers will be entered in the defaulters' book (Commissariat Transport Form 33) which will be kept up at each depôt and out-station, also by regiments supplied with regimental transport (para. 1894, Vol. V).

Entries of offences in service books.

When awarding punishments, it should be considered whether the offence is sufficiently serious as to call for its entry in the followers' service book. This considerably enhances the punishment, as natives particularly dislike having disparaging entries in their books.

Discipline of agents.

Transport agents are not attested. They can be punished by fine up to one-fourth of their monthly pay for neglect of duty, or they can be suspended for more serious offences and reported to the Commissary General. When submitting such reports, a definite charge must be preferred against the man, and this should be forwarded together with his written defence. Temporary agents may be discharged by the officer under whom they are serving.

Sick reports.

(Para. 1898, Vol. V.) When transport followers are sent for treatment in hospital, sick report (Commissariat Transport Form 31) is sent with them. The report will be returned when the man is discharged from hospital.

Attendants of regimental transport of native corps are treated in the Regimental Hospital.

Deserters.

(Para. 1901, Vol. V.) When an unattested follower deserts in peace-time, nothing can be done, unless he takes away his Government clothing, when he can be prosecuted for theft. It is difficult however to secure a conviction, as pleaders avail themselves of legal loopholes and the man gets off as often as not.

Attested followers who desert can, if arrested, be dealt with under the Indian Articles of War.

In either case an extract from the Descriptive Register, with all available information about the deserter, should be sent to the Civil and Police authorities in the station, and to the Civil authorities of the District to which the deserter belongs, in view to measures being adopted to ensure his apprehension.

Disposal of effects.

Paras. 1902 and 1903 deal with the disposal of the effects of transport attendants who may die in the service.

When casualties occur on field service, action should be taken in accordance with paras. 107 and 132 of the Commissariat Field Service Code.

Rations on field service.

Free rations are issued to transport establishments on field service under the provisions of paras. 159, 160, 161, 173 and 174, Commissariat Field Service Code.

The daily scale of field service rations for transport followers is as follows :—

Atta or Rice	1½ lbs.
Dál	4 ozs.
Ghee	1 oz.
Salt	⅔ of oz.
Amchur	½ oz. (dried mango).
Fuel	1½ lbs.

(See Commissariat Field Service Code para. 233.)

(Para. 213, Vol. V.)—The claims to pensions and gratuities of employés with inferior service who joined the department prior to the 27th February 1889 are dealt with under the rules in the Civil Pension Code at that time existing. From the 27th February 1889 the following classes of followers will alone be granted retiring and invalid pensions, and their periods of service for pension will date from attestation, except in the case of individvals who have qualifying service under previous rules :—

Pensions to jemadars, duffadars and drivers.

Ambulance	Sirdar Bearers	Retiring and invalid pensions as laid down in Articles 585 and 588, A. R. I., India, Vol. I, Part II, for the Army Hospital Native Corps.	If invalided before completing the prescribed period of service for pension, they will be entitled to gratuities under the provisions of Articles 20, 21, 27, 28, Army Regulations, India, Vol. I, Part II.
	Mate Bearers		
	Bearers		
Transport	Jemadars, Mahouts, Coolies	Of the attested Elephant Establishment.	
	Jemadars, Duffadars, Drivers	Of the attested Bullock Establishment, including those with Siege Trains.	If invalided after a service of 20 years, one-third of average monthly pay of previous 3 years, and after 30 years' service, a retiring pension of half the average monthly pay of previous three years.
	Jemadars, Duffadars, Muleteers	Of the attetsed Mule Establishment.	
	Jemadars, Duffadars, Surwans	Of the attested Camel Establishment.	
	Salutris drawing less than Rs. 30 a month.		

NOTE—i. Drivers with ponies or donkyes are included under muleteers.

ii. Salutris drawing Rs. 30 per month and over are reckoned as superior servants under Article 435, Civil Service Regulations.

Commissariat transport employés not enumerated above, joining from the 27th February 1889, who have rendered exemplary or meritorious service, and who are invalided in consequence of such service, will, in special cases, be eligible for gratuities or compassionate allowances on the following scale, each case being considered at the time on its merits :—

To men of less than 5 years' service	Nil.
To men of not less than 5, but less than 10 years' service	3 months' pay as gratuity.
To men of not less than 10 but less than 15 years' service	4 do.
To men of not less than 15 but less than 20 years' service	5 do.
To men of not less than 20 years' service...	6 do.

After a service of not less than 30 years, a compassionate allowance not exceeding Rs. 4 a month.

LECTURE XIV.

Measurement and Branding of Transport Animals. Descriptive Marks and Registers. Shoeing of Mules, Ponies, Donkeys and Bullocks.

Measurement of height.

The height of transport animals is measured from the highest point of the withers to the ground. Bullocks are measured from immediately behind the horns. The measurements of camels and elephants are recorded in feet and inches. That of mules, ponies, donkeys and bullocks in hands and inches. 1 hand = 4 inches.

Measuring standard.

The measuring standard consists of an upright shaft with measurements recorded on it, and a cross arm fixed at right angles to the upright and sliding on it.

Measurements of height must be taken on perfectly smooth ground, and the butt of the shaft must be level with the animal's feet. When the measurement is taken, the standard must be vertical and the cross bar at right angles to it. The animal should be standing naturally with his forefeet close together.

Young mules and bullocks difficult to measure.

It is often difficult to get the correct measurement of young mules or bullocks, as they crouch under the standard. When mules and bullocks are frightened, they should be blindfolded and the withers or hump should be rubbed with the hand before the cross bar is allowed to touch it.

(Note.—Method of measurement should be illustrated.)

Branding transport animals.

The rules for branding transport animals are laid down in paras. 1910, 1911, 1912, 1913, and 1914, Vol. V, and paras. 934, 935, 936, of the Commissariat Field Service Code.

Branding camels, mules, ponies and donkeys.

Camels, mules, ponies and donkeys are branded—

On the left side of the neck.—The last two figures of the year of purchase, and underneath them the initial letter of the regiment on the rolls of which the animal is first brought.

LECTURE XIV.

Measurement and Branding of Transport Animals. Descriptive Marks and Registers. Shoeing of Mules, Ponies, Donkeys and Bullocks.

NOTE.—For the illustration of this lecture the following will be required:—

Measuring standard for mules and bullocks.
Large measuring standard for camels and elephants.
Branding irons, large and small.
Clippers.
Animals for practical illustration of branding.
Rope twitch.
Cord for muzzling camels.
Commissariat Transport Form No. 19 (Descriptive Register of Animals).
Animals showing various particular marks and blemishes as described in the lecture.
Dried sections of the fore and hind foot of a mule and bullock.
A set of mule and bullock shoes with countersunk nails to be ready.
Sets of bazaar shoes and nails also to be shown.
The feet of a mule and bullock to be prepared for shoeing before the class and shoes afterwards fastened on.

Measurement of height.

The height of transport animals is measured from the highest point of the withers to the ground. Bullocks are measured from immediately behind the hump. The measurements of camels and elephants are recorded in feet and inches. That of mules, ponies, donkeys and bullocks in hands and inches. 1 hand = 4 inches.

Measuring standard.

The measuring standard consists of an upright shaft with measurements recorded on it, and a cross arm fixed at right angles to the upright and sliding on it.

Measurements of height must be taken on perfectly smooth ground, and the butt of the shaft must be level with the animal's feet. When the measurement is taken, the standard must be vertical and the cross bar at right angles to it. The animal should be standing naturally with his forefeet close together.

Young mules and bullocks difficult to measure.

It is often difficult to get the correct measurement of young mules or bullocks, as they crouch under the standard. When mules and bullocks are frightened, they should be blindfolded and the withers or hump should be rubbed with the hand before the cross bar is allowed to touch it.

(NOTE.—Method of measurement should be illustrated.)

Branding transport animals.

The rules for branding transport animals are laid down in paras. 1910, 1911, 1912, 1913, and 1914, Vol. V, and paras. 524, 525, 526, of the Commissariat Field Service Code.

Branding camels, mules, ponies and donkeys.

Camels, mules, ponies and donkeys are branded—

On the off-side of the neck.—The last two figures of the year of purchase, and underneath them the initial letter of the command on the rolls of which the animal is first brought.

On the near side of the neck.—The letter G, and below it the serial number of the year on the rolls of the command. A fresh set of serial numbers will be commenced every year.

Branding bullocks.

Transport bullocks are branded on the near haunch with the last two figures of the year of purchase.

On the off horn, about four inches from the base, the initial letter of the command.

On the near horn the yearly serial number of the command.

Bullocks bred at the Hissar farm receive special brands when leaving.

Horn brands.

Horn numbers measure half an inch from top to bottom.

Flesh brands.

Flesh brands should measure three inches from top to bottom.

The base of each letter should be half an inch broad and should taper down to an edge. The brands should be fixed to the iron handle by claws rivetted through the figure just below its base.

When making brands, each number should be measured from top to bottom

Testing brands.

and be stamped on soft earth, when any want of finish or symmetry can be detected.

Para. 1914, Vol. V, recommends that animals should be thrown when branded.

Method of branding bullocks.

This is certainly advisable in the case of bullocks, as the brand is very liable to slip on the muscles of the quarter. It is, however, difficult to brand an animal neatly on the neck when it is thrown. The head and neck cannot easily be kept in a natural position, and the skin gets strained and drawn out of place. Consequently, when the animal gets up, the brand looks clumsy and distorted.

An effectual way of branding mules, ponies and donkeys on the neck is to

Branding mules, ponies and donkeys.

blindfold the animal, apply the "Hayes' rope twitch," and secure him with his muzzle close to a strong ring in a wall or post about 3 feet 6 inches from the ground. If the coat is long, first clip both sides of the neck ; then bring the iron to a dull red heat; brush off any flakes by rubbing it against the anvil and press it firmly against the neck, keeping the number at right angles to the general run of the neck. About three seconds are sufficient if the hair has been previously clipped. The centre figure of a number should be half way between the head and the shoulder. The figures should be parallel to each other, a space of about one inch being left between them.

To brand a camel on the neck, make him sit down, tie the legs so that he

Branding camels.

cannot rise. Close his mouth with a cord, making a clove hitch round both jaws. Bring the ends of the cord back between the ears and tie them together, then separate them and secure under the throat. This is a very effectual muzzle. Clip the neck and brand as described for the mule and pony.

A three-inch brand is rather large for donkeys ; numbers and letters two inches long would be quite sufficient.

(NOTE.—Illustrate the method of securing and branding mules, bullocks and camels with cold brands if no animals require branding. Also show the proper position of the figures on the neck and results of good and bad branding.)

Descriptive Registers.

Branding newly-purchased animals.

To prevent newly-purchased animals being changed, special permanent and temporary brands are made immediately the animal is purchased (paras. 524, 525, 526, Commissariat Field Service Code).

After branding, the parts should be daily dressed with camphorated carbolic oil to keep off flies and putrefying germs. Ointment collects dust if the weather is dry.

Descriptive Registers.

Descriptive Registers of Transport Animals (Commissariat Transport Form No. 19) are to be kept up at all stations and by all corps provided with Regimental Transport (para. 1908, Vol. V).

Under the heading "Brands" in the Register, sub-headings of "Near Neck" and "Off Neck" must be entered.

Branding and Descriptive Registers are instituted with a view to identifying Government animals on all occasions and also to enable them to be sorted out after a campaign.

Distinctive marks and blemishes.

Brands, however, sometimes wear out, or the hair may be long and they cannot be distinguished. As a further assistance a column in the Descriptive Register is provided under the heading "Particular Marks or Blemishes," and these should be noted in all Descriptive Registers.

In the pony.

In ponies the ordinary indelible marks are "saddle marks," or patches of white hairs on the withers and sides, caused by pressure of the saddle or old galls.

"Girth, breast-piece, and crupper marks" are white lines caused by friction or galls.

"Rope marks"—white marks on pasterns and legs caused by tethering ropes.

"Súndkha marks"—white hairs and thickened skin in front of the withers and on the loins, caused by the pressure of the native "Súndkha."

Firing marks on the arms, thighs, neck, loins and abdomen, the result of drastic remedies used by natives for colic, cold in the head, or rheumatism.

Spots of any colour, gray hairs in the mane and tail, black mane and tail, black legs and feet, scars, white feet and legs, light-coloured muzzle, and irregularities of the teeth are also distinctive marks.

Any white spot or patch on the forehead is called a "star."

A white streak down the face is called a "race" or "blaze."

A white mark running into one or both nostrils is called a "snip."

In the mules.

The mule is liable to have any of the above marks, and in addition he often inherits from the donkey and zebra a dark mark running from the withers down the shoulder and a dark line down the back.

These two marks are called the "donkey cross."

"Zebra marks" are dark rings round the legs, generally about the knees, and hocks.

In the donkey.

The donkey may have any of the pony or mule marks, and in addition the nostrils are often slit.

In the camel.

Camels are distinguished by firing marks, saddle girth, and crupper marks, scars and rope marks.

In the bullock. Bullocks may have similar marks to camels. Their ears are sometimes serrated round the edges.

In the elephant. Elephants have also many distinctive marks, such as spots, light splashes, scars, torn ears, etc.

The following will illustrate the method of describing animals on the register so that they will always will be recognised :—

Illustrations of suitable descriptions of different animals.

(*a.*) *Description of a Pony* on Form 19—

No. 1—Gelding, 4 years, 12 hands 3 inches, bay, off neck $\frac{91}{R.P.}$, near neck $\frac{G}{35}$, quiet. Marks—star, race, snip into near nostril, girth marks, rope marks both hind pasterns. Received from Rawal Pindi November 1891.

(*b.*) *Description of a mule*—

No. 1—Mare, 5 years, 13 hands 2 inches, light bay, 1st class, off neck $\frac{89}{M}$, near neck $\frac{G}{40}$, kicker. Marks—saddle and girth marks, fired on belly, donkey cross, zebra marks knees and hocks. Received from Meerut June 1889.

(*c.*) *Description of a Donkey*—

No. 1—Stallion, 6 years, 10 hands 3 inches, brown, 2nd class, off neck $\frac{92}{P}$, near neck $\frac{G}{50}$, quiet. Marks—light muzzle and breast, sundkha and saddle marks, slit nostrils, rope mark near fore. Received from Peshawar January 1892.

(*d.*) *Description of a Camel*—

No. 1—Stallion, 4 years, 7 feet, light brown. Off neck $\frac{90}{K}$, near neck $\frac{G}{40}$, vicious. Marks—saddle and girth marks, fired on both quarters. Received from Karachi May 1890.

(*e.*) *Description of a Bullock*—

No. 1—Gelding, 6 years, 12 hands 2 inches, red and white, near haunch 88, off horn A, near horn 16. Quiet, but inclined to jib. Marks—chipped ears, whip marks on both quarters. Received from Umballa February 1888.

(*f.*) *Description of an Elephant*—

No. 1—Female, 35 years, 8 feet, medium class, black, value Rs. 1,500, name "Huntress," uncertain temper, no tusks, white spots neck and shoulders, scars from tiger-bite near quarter. Received from Mysore 1875.

Inspection of registers. The Inspecting Commissariat Transport Officer will note at his annual inspection if the descriptive register is neatly kept.

Shoeing. The question of shoeing transport mules and bullocks is now under the consideration of the authorities. Experience shows that as a rule mules, ponies and donkeys do not require shoeing as long as the weather is dry. In fact about 90 per cent. will work continuously without shoes in dry weather. Occasions, however, arise when it is necessary to shoe a large number of mules on account of tender feet. This is generally caused by working on metalled roads in very wet weather. The continuous rain washes the gravel and loam from the roads, leaving a surface of rough stones. The animals' feet become soft from walking in the wet and wear away quickly against the stones until the sensitive portions of the

foot are pressed upon and the animal goes tender. It then becomes necessary to shoe all the mules whose feet are much worn, and on this account it is wise to take on the march a pair of fore-foot shoes and a set of nails for each animal, so that there will be no delay should shoeing become necessary.

Spare shoes and nails.

It is also a useful precaution, in climates where the rainfall is heavy and animals work on metalled roads, to keep up for each mule a pair of fore-foot shoes and a set of nails, the fore-feet being more liable to injury than the hind ones.

The tenderness above described is generally only temporary, and when the hoof has grown sufficiently under the shoe, the animal will again be able to work without shoes for many months.

In most depôts and regiments there will generally be a few mules with brittle feet, which will require shoeing under all circumstances.

The following are some practical rules for shoeing mules and ponies.

One good principle runs through all good shoeing, namely, the preservation of the outer case of the foot.

This principle includes—

1*st*—The preservation of the crust and bars whole and entire.

2*nd*—The preservation of the sole.

3*rd*—The preservation of the frog.

The foot may be described as a box. The sides and bottom of this box consist of insensitive horn lined with a soft vascular sensitive growth.

The box contains two bones and a portion of a third enclosed within its outer case.

The outer case consists of four parts—

1*st*—The crust or wall.

2*nd*—The sole.

3*rd*—The frog.

4*th*—The bars.

In shoeing, if the outer case is preserved, nature will, as a rule, take care of the interior structures.

The crust or wall will suffer if rasped outside. It consists of fibres growing down from the thickened skin round the coronet in the same way that the nails grow from the skin of the fingers. In the natural state of the foot, these fibres harden as they grow down, and when they join with the sole of the foot, they are ready to be worn off by constant friction with the ground.

The first essential of good shoeing is that the outside of the crust be not rasped. This farriers are fond of doing to secure what appears to the inexperienced eye a good fit, whereas really a small shoe has been put on, and the outer fabric of the wall destroyed so as to make the shoe appear to fit properly.

As, however, the shoe protects the crust from the natural friction and wear against the ground to which it would have been subjected if it had not been so protected, it is necessary each month to lower the crust as much as will represent what would have been the natural loss by wear. This varies in different animals ; in some feet the growth is much more rapid than in others.

In preparing the foot, the ground surface of the wall must be sufficiently rasped and made perfectly level for the reception of the shoe.

The bars are an inflection inwards of the walls at the heels. They are stays provided by nature to prevent the back part of the foot contracting. In shoeing, the bars should be let alone, and they will then perform their duties. If they are cut away, the heels will contract.

The sole should also be left alone. When it has grown sufficiently thick, nature provides that it shall ex-foliate, or cast off flakes of horn.

The frog requires the same treatment as the sole, namely, to be left alone. It is an elastic pad placed at the back of the foot and ex-foliates in flakes in due time ; therefore it need not be pared if sound and healthy. But frogs become diseased by carelessness if the feet are not kept properly clean, and animals are allowed to stand in dung and urine. Inflammation is set up and a nasty discharge issues from the cleft of the frog. This disease is called "thrush," and when it is present, all ragged parts of the frog should be removed with the drawing knife so as to prevent the accumulation of dirt and consequent increased irritation.

Thrush.

When a healthy foot has been prepared for the shoe, the front part of the crust should be at an angle of 50° with the ground. By examining the length of the feet of unshod pack mules in regular work, you will be able to determine approximately to what extent the ground surface of the wall of a foot should be reduced by the rasp when preparing it for shoeing.

The breadth of a shoe for a mule or pony should be about five-eighths of an inch, and as regards length, should extend to that part of the heel where the bar commences. If shoes are shorter than this, they are liable to produce corns. The shoe for a mule or pony should be about three-sixteenths of an inch in thickness with a slightly concave ground surface.

Dimensions of shoes.

The wall having been lowered by the rasp, the shoe must be so fitted that its outer edge corresponds exactly with the crust. It must not be smaller than the crust, nor overlap it in the smallest degree. The shoe, whether fitted on hot or cold, must exactly coincide with the ground surface of the foot.

Fitting the shoe.

When removing old shoes, cut the clenches carefully, without injuring the crust, and each nail should then be drawn separately, and the shoe should on no account be wrenched off the foot without first extracting the nails.

Five nails are sufficient for securing the shoe of a mule or pony—three on the outside of the foot and two on the inside. Nails must be made of the best iron. Nail holes should be countersunk so as to allow the head of the nail to be driven into the thickness of the shoe. When this is done, the heads of the nails do not wear out till the shoe itself is worn through.

Nails.

For mules and ponies the nails should be brought out in the hoof from $\frac{3}{4}$" to 1" above the shoe. The heel nails may be brought out somewhat lower than the toe and quarter nails.

Shoeing smiths must not be allowed to use a block of wood to rest the animal's foot on for the purpose of performing the barbarous operation of rasping the outside crust to meet a badly-fitted shoe.

No assistant is necessary to hold up the foot during the operation of shoeing, and this should not be allowed.

Shoeing Bullocks.

Nails should not be allowed to lie about the floor of a shoeing shed, as they may run into animals' feet and cause dangerous wounds.

Shoeing-smiths must pay constant attention to the feet of unshod animals, which sometimes become ragged and broken at the lower edges of the crust, which must then be rasped smooth to prevent the injuries extending.

Unshod feet require attention.

Bullocks.

It is almost always necessary to shoe draught bullocks.

The foot of a bullock is divided into two claws. Each claw is complete in itself and is similar to the foot of the horse, having a wall and sole of horn lined with sensitive membranes, and containing two bones and the lower portion of a third bone (the lower pastern bone). This division of the foot really begins below the knee, as there are two fully-developed cannon bones blended together and separating at the fetlock joint, where each division rests on a separate pastern bone.

The growth of the foot is the same as that of the horse or mule, and the same rules apply as regards removing the old shoes, rasping the crust, and fitting the shoe to the foot.

In shoeing a bullock, a separate shoe is attached to each claw.

A bullock-shoe should be about seven-eighths of an inch broad and one-sixth of an inch thick, slightly seated out on the inner side of the upper surface to prevent undue pressure on the sole, and bevelled off on the inner edge of the ground surface to lighten the shoe.

Bullock shoes.

The outer edge of the shoe should exactly follow the outer edge of the crust to the extremities of the claw, where the shoe should be rounded off.

The three nail holes should be countersunk at equal distances along the shoe and close to the outer edge, as the insensitive walls of a bullock's claw are thin and there is not much room for driving nails which should be of the countersunk pattern and brought out from half to three-quarters of an inch above the shoe according to the size of the animal.

The ordinary bullock-shoe used by native shoeing-smiths presents the following defects :—

(*a.*) It is made of soft thin iron and easily bends, often bruising the sole and causing lameness.

(*b.*) It is secured to the foot by four nails with flat heads, which easily wear off.

(*c.*) The nail holes are grouped together on the anterior portion of the shoe, and there is nothing to secure the posterior portion, which easily becomes loose and displaced.

(*d.*) The crust is also injured by having so many nails driven close together.

It is usual in India to throw bullocks previous to shoeing. When this is done, they must be carefully thrown on a soft bed.

The shoeing-smiths should attend the Veterinary Surgeon at his periodical inspection and point out all mules and bullocks which have been shod since his last inspection. Any mistakes they may have made will then be explained to them.

Shoeing-smiths to attend Veterinary Surgeon's inspections.

LECTURE XV.

Equipment of Mules, Ponies, Bullocks, and Donkeys. Saddlery and Gear—Sources of supply of; Marking and Care of; Returns required in connection with.

(NOTE.—For illustration of this lecture we require the various articles of gear, etc., which have not already been shown in connection with previous lectures.)

The scale of gear for mules and ponies authorized by Appendices 46, 47 and 48, Vol. V, A. R. I., is as follows :—

APPENDIX 46.

I. Supplied by the Ordnance Department.

(*a*) Gear common to pack and draught animals—

1 Bit bridoon with head and rein	per animal.
1 Breeching { long or short	per animal.
1 Collar head-stall with brow-band, eye-fringe and throat-lash	per animal.
1 Crupper with dock	per animal.
2 Girths, web { long or short	per animal.
1 Pad saddle, pairs	per animal.
1 Saddle { No. 1 small or No. 2 large or No. 3 Yaboo	per animal.
2 Picks	per 100 animals.
2 Shovels...	per 100 animals.

(*b*) Special for pack animals—

1 Breast piece { long or short	per animal.
1 Set ropes, baggage with rings, 2 pairs or 4 ropes...	per animal.
1 Tarpaulin, 10′ × 6′	per 3 saddles.

(*c*) Special for draught animals—

1 Iron arch attachment with pin and leather thong...	per saddle.
1 Connecting strap to strap curricle bar to iron arch attachment	per animal.
1 Pair traces, wheel	per animal.
2 Straps for supporting traces	per animal.
1 Breast piece	per animal.
1 Bit, driving	per animal.
2 Buckling pieces for bit, driving	per animal.
1 Pair reins, driving, double	per pair of animals.
1 Whip	per pair of animals.
1 Connecting rod	per pair of animals.
1 Tarpaulin 10′ × 6′	per pair of animals.

Gear and Saddlery.

II. Supplied by Commissariat Department.

(*a*) Gear common to pack and draught animals—

1 Feeding bag	per animal.
1 Fore shackle chain	
1 Fore foot shackle	
1 Hind foot shackle	
1 Heel chain	
1 Jhool	
2 Pegs, iron	
1 Bucket, canvas	per 3 pack or 2 draught animals.
1 Brush	
1 Curry-comb	
1 Pair forage nets	
1 Sickle	
1 Hammer, iron	per 25 animals or fraction of 25 animals.
1 Line rope for marking out lines	
1 Pair scissors	per 50 animals or fraction of 50 animals.
1 Clipper	
1 Basket	per 25 animals or fraction of 25 animals.
1 Broom	

(*b*) Gear for mules or ponies on water duty in addition to the gear of Ordnance* and Commissariat supply for pack animals detailed above—

1 Pair puckals, capacity 18 gallons (to admit of delivering 16 gallons water)	per animal.
1 Hide or chursah leather	
1 Bucket, leather	per 20 animals.

Appendix 47.

Spare Gear for Pack and Draught Animals.

Ordnance Supply.

Breechings	5 per cent.
Collar head-stall with brow-band, eye-fringe and throat-lash	
Cruppers with docks	
Pads, saddle	
Bits, bridoon, with head and rein	10 per cent.
Girths, web	15 per cent.

Special for Pack Animals.

Ropes, baggage, with rings, sets with 2 pairs or 4 1 ropes	10 per cent.
Breast pieces	5 per cent.

Special for Draught Animals.

Breast pieces	5 per cent.
Reins, driving, double, pairs	
Traces, wheel, pairs	
Buckling pieces for bits, driving	
Connecting straps for attaching curricle bar to arch attachment	
Connecting rods, iron	

* Old Ordnance gear to be retained whenever available for water duty, in addition to the saddlery maintained for other duties (*vide* para. 2045, Vol. V).

Gear and Saddlery.

Articles supplied annually for repair of gear per 100 *animals.*

Ordnance Supply.

1	Bucket, iron, roller, single	... ...	$2\frac{1}{2}$ inch
2	Do.	do.	2 ,,
2	Do.	do.	$1\frac{3}{4}$,,
12	Do.	do.	$1\frac{1}{2}$,,
4	Do.	do.	$1\frac{1}{4}$,,

75 yards serge for lining saddle.

5 lb. thread, flax, sewing, coarse.

5 lb. thread, whited brown, do.

100 lb. / 50 lb. } hide, buffaloe { heavy. / light.

80 lb. hide, cow, tanned, or curried.

Commissariat supply (*vide* para. 1833).

5 lb. twine.

50 lb. wool, sheep, cleaned and teased, per month.

Note.—Regimental Transport Officers will obtain the twine and sheep's wool according to the procedure laid down in para. 1831.

Appendix 48.

Army Transport Carts.

Ordnance Supply.

(*a*) Mule and Pony double draught—

1	Straight pole	per cart.
1	Curricle bar	
2	Swingle trees	
1	Swivel for curricle bar	

(*b*) Bullock double draught—

1	Split pole	per cart.
1	Yoke with 2 throat-lashes, leather...	

(*c*) Articles common to Mule and Pony and Bullock draught—

1	Loading rope, cotton, 2″ circumference and 60′ long.	per cart.
1	Spanner	
1	Tarpaulin, 12′ × 8′	

The scale of gear for donkeys (Appendix 49) is—

Commissariat Supply.

1	Saddle, súndka pattern (complete with pad, súndka, breeching breast-piece and girths) ...	per donkey.
1	Saddle cloth	
1	Loading net	
1	Canvas sheet	
1	Jhool	
1	Sickle	per 5 donkeys.
1	Bucket, canvas	
1	Curry-comb	
1	Brush	
1	Picketting rope (with 25 foot ropes)	per 25 donkeys
2	Pegs, wooden, picketting	
1	Basket	per 25 donkeys, or a fraction of 25 animals quarterly
1	Broom	
1	Packing needle	per driver.

GEAR AND SADDLERY.

Pack Bullocks are supplied with (Appendix 50)—

	Commissariat Supply.
1 Saddle, súndka pattern (complete with súndka, pad, breeching and girths web)	per bullock
1 Saleetah with rope	per bullock
1 Jhool	per bullock
1 Eye-fringe	per bullock
1 Canvas sheet	per 5 bullocks.
1 Pair forage nets	per 5 bullocks.
1 Brush	per 5 bullocks.
1 Curry-comb	per 5 bullocks.
1 Feeding cloth	per 5 bullocks.
1 Picketting rope	per 5 bullocks.
2 Pegs, picketting, wooden	per 5 bullocks.
1 Sickle	per 5 bullocks.
1 Mallet, wooden	per 25 bullocks.
2 Buckets, canvas	per 25 bullocks.
1 Broom	per 25 bullocks or fraction of 25 animals quarterly.
1 Basket	per 25 bullocks or fraction of 25 animals quarterly.
1 Nose rope	per bullock for animals accustomed to be used with these articles.
1 Head rope	per bullock for animals accustomed to be used with these articles.

Draught Bullocks are allowed (Appendix 51)—

	Commissariat Supply.
1 Jhool	per bullock.
1 Eye-fringe	per bullock.
1 Nose rope	per bullock.
1 Head rope	per bullock.
1 Peg, picketting, wooden	per bullock.
1 Feeding cloth	per pair of bullocks.
1 Brush	per pair of bullocks.
1 Curry-comb	per pair of bullocks.
1 Whip	per pair of bullocks.
1 Pair reins	per pair of bullocks.
1 Mallet, wooden	per 25 animals.
1 Picketting rope	per 25 animals.
2 Buckets, metal, 3-gallon	per 25 animals.
1 Broom	per 25 bullocks or fraction of 25 animals quarterly.
1 Basket	per 25 bullocks or fraction of 25 animals quarterly.

Scale of gear arranged to suit scales of attendants.

It will be noticed that all the above scales of gear have been arranged to suit the number of attendants allowed for each class of animal, as there are several articles of gear, such as brushes, curry-combs, buckets, etc., of which it is necessary that one should be in the possession of each driver.

Gear and Saddlery.

Elephant and Camel gear have already been described in Lectures IV and V. The stable gear of mules, ponies and bullocks was treated on in Lecture IX (Stable Management), and the remaining gear of transport animals calls for the following remarks.

The different saddles and saddle pads in use with mules, ponies, bullocks and donkeys will be discussed in the lecture on Pack Saddles.

Mule and Pony Gear (Appendix 46, Vol. V).

Breeching and crupper.

The breeching and crupper are used to keep the pack saddle from slipping forward when the animal is going down hill.

The breeching is kept in its place by a croup strap buckling on the near side. The crupper also steadies the saddle and checks the front and rear motion of the load when the animal is walking on level ground.

Persian pattern breeching and croup strap.

A short time ago a Persian pattern of breeching and croup strap, both very broad, was adapted to the Indian transport equipment, but it was given up after a short trial, as the croup strap, being in one piece, was not adjustable and could not be readily altered to fit animals with broad and narrow quarters. In Persia this pattern answers well, but the leather used is very soft and each animal has its own equipment made to fit it. Moreover the "charwadar" or muleteer is ever on the watch for anything going wrong. The animals are generally his own property, and he knows that, if they are thrown out of work from galls, his pocket will suffer heavily.

Girths of Ordnance saddle.

The girths of the Ordnance saddle are made of strong webbing with iron buckles sewn into stout leather, which is strapped over the webbing at each end.

Pack breast-piece.

The pack breast-piece is made of soft leather in three folds. With this pattern, if the leather is kept soft, there is no danger of the neck or shoulders being galled.

Tarpaulin.

The tarpaulin is used for protecting the saddle on the march and in camp.

Draught equipment.

The draught equipment of mules and ponies will be discussed in a future lecture on "Carts and Draught."

Unserviceable saddlery for water duty.

When mules and ponies are employed on water duty, unserviceable ordnance saddlery should be retained for this work; but the saddle tree must be sound and the pads properly stuffed and lined ; otherwise the animals' backs will certainly suffer.

The leather charsa is supplied to protect the loins and quarters from the constant dripping from the water bags. If this was not done, the animals would suffer from rheumatism and severe chills.

Fitting of charsah for water duty.

(Para. 2045, Vol. V.) Before the leather charsa is used, it should be thoroughly dubbed, and it can then be placed over the saddle and under the water bags.

Two slits can be made to admit the front and rear arches so that the charsa will lie flat on the saddle. Leather flaps should be attached to the slits so that the water will not drip through on to the saddle or loins.

The leather packháls or water bags should also be dubbed before use and also whenever they are re-issued for water duty after having been retained in store. (For scale of dubbing, see para. 2046, Vol. V.)

Packháls.

The leather bucket is used for filling the water bags from wells, springs or tanks.

Buckets for water duty.

The allowance of one bucket to 20 animals on water duty seems very small, but the mules also have their canvas buckets (Appendix 47).

Spare gear and repairing materials (Ordnance supply).

Spare gear is kept up for mules and ponies according to appendix 47. Repairing materials for Ordnance gear are also supplied yearly by the Ordnance Department.

With reference to this scale, it may be remarked that spare 2½" and 2" buckles are not required.

The composition and manufacture of these materials will be discussed under the lecture on "Repairs and Artificers."

Donkey gear.

Donkey gear (Appendix 49).

The loading net is used for carrying various loads, and this will be practically illustrated when the loading of donkeys is subsequently practised.

The *canvas sheet* is used for protecting the loads and gear from stress of weather and also as a feeding cloth for the animal. It has brass eyelets with thongs on the corner for securing it over loads. The pattern picketting rope is not long enough for the required purpose. It has 25 foot-ropes attached to it for shackling the donkeys, but these are very close together, and the animals have not sufficient room to stand or lie down comfortably.

Moreover over-crowding is always inimical to good health.

The breechings and breast-pieces are made of double cotton webbing sewn together and stuffed with wool.

Pack bullock gear.

Gear of pack bullocks (Appendix 50).

The *salita* is used for wrapping and supporting loads ; its use will be practically illustrated at subsequent loading drills.

The rope eye-fringe is adjusted in front of the horns and secured behind them. The pattern eye-fringe has long rope ends to fit the heads of the largest sized bullocks ; with medium or small sized bullocks these long ends are an encumbrance and may be cut off to a suitable length.

The *canvas sheet* is supplied with brass eyelets and thongs, so that it can be secured over loads and fastened up when the gear is placed in it at night.

The *crupper* and *breast-piece* are similar to those of donkey gear.

The feeding cloth is made of "tát"—a coarse cloth manufactured out of vegetable fibre. One is allowed to five pack bullocks. The great objection to this is that the bullocks eat against each other and bolt their grain. A quick feeder gets more than his share, and a slow feeder has to go on short commons.

Bullock feeding cloth.

However in cantonments and on service, pieces of tát and bags are generally procurable, and quick feeders should be fed separately. The only satisfactory method, however, is to provide a separate piece of cloth for each bullock.

Picketting rope.

The *picketting rope* has five neck ropes attached to it, and one picketting rope with two wooden pegs is allowed for every five bullocks.

(NOTE.—The sytsem of picketting pack bullocks and donkeys to be practically illustrated.)

The present pattern of nose rope and head rope for pack and draught bullocks are made of country hemp.

Nose ropes.

The nose rope is rather thick and is made long enough to fit the largest sized bullocks. Spare ends will accordingly have to be removed for medium and small sized animals.

In Southern India a thin cotton nose rope is generally used by the natives of the country. They hold that it stands wear better than hemp and, being soft and smooth, does not irritate the nostrils.

The head rope is secured round the horns and is used for leading and securing the bullocks.

Nose ropes and head ropes are only issued to pack bullocks accustomed to be used with these articles. Nose ropes, however, are generally used with draught bullocks.

Inserting and fitting nose ropes.

To fit a nose rope to a newly-purchased animal, he must be thrown. The cartilage between the nostrils is pierced with a strong needle with a thick base, to which is attached the pointed end of the nose rope, which is then drawn through the hole made by the needle. The ends of the nose rope are secured behind the horns and should not be drawn too tight. The wound will heal in a week or ten days, but should be watched to see that flies do not get at it. The bullock will generally keep the wound clean by licking it.

Scale of pack bullock gear increased under certain circumstances.

Sometimes, when the country to be worked in is very difficult, the scale of drivers is increased. For instance in the Manipur Expedition of 1891, where thick jungle and difficult tracks had to be traversed, one driver was allowed to every two pack bullocks, and the gear was altered accordingly ; brushes, curry-combs, feeding cloths, picketting ropes and sickles being allowed at the rate of one to every two bullocks, instead of five as laid down in the scale. Should the necessity arise, this system could also be applied to mules, ponies and donkeys.

Draught bullock gear.

Draught bullock gear (Appendix 51, Vol. V).

The head rope is fastened round the base of the horns and is used to secure the bullock to the peg.

The picketting rope can be used in case of pegs breaking, but it is not required while we have a peg for each bullock.

Bullock whips and *reins* will be mentioned in the lecture on Carts and Draught.

Appendix 27 of the Field Service Code gives the weight of different articles of transport gear and describes the method of packing reserve gear for despatch to the field.

All mobilisation gear is kept ready packed in accordance with these instructions

Gear and Saddlery.

(Para. 1833, Vol. V.) Issues and renewals of saddlery and gear will be made by the Ordnance or Commissariat Transport Department according as the articles may be of Ordnance or Commissariat Transport supply.

Issues and renewals of saddlery and gear.

Gear of Ordnance Department supply is indented for on Indian Ordnance Form No. 278.

The various clauses of para. 1833, Vol. V, are now under revision.

Mobilisation reserves of gear (Commissariat Transport supply) are kept up at various stations in India, and supplies of gear to Depôts and Regimental Transport are generally made from these reserves, which are replenished by gear supplied by contract or made up under departmental arrangements.

Mobilisation reserves of gear.

Gear of Commissariat Transport supply must be indented for on Commissariat Form No. 65.

In making contracts for transport gear (Commissariat Transport supply), it is usual to stipulate that the work shall be carried out under departmental supervision. This is a necessary precaution, especially if there is any urgency for a speedy supply, as contractors will never make transport gear equal to sealed pattern unless they are closely watched (para. 1932, Vol. V).

Contracts for gear.

Gear is marked with the initial letter of the supplying station, followed by the letter T.

Marking gear.

(Para. 1933, Vol. V.) When gear is issued to animals, it is further marked with their register numbers, also the month and the last two figures of the year of issue ; thus the interpretation of $\frac{\text{MT.}}{120\ \frac{5}{90}}$ is that the article was supplied at Meerut and issued in April 1890 to an animal whose number is 120 on the Meerut Register. These numbers should be punched on leather work.

The marking of other articles can be effected with silicate paint in 1½″ stencil letters and numbers. Half-inch letters and numbers are large enough for stamping leather work.

This system of marking will prevent the gear being changed and will fix responsibility in the case of damage or loss.

All spare leather articles in store must be kept in dubbing. Other mobilisation articles made of chut, tát, canvas and blanketing are kept in air-tight packages.

Care of gear in store.

Before packing, the gear should be thoroughly sun-dried to protect it from moths and then packed in gunny ; a few nim leaves and pepper corns can be added ; these, it would appear, are not actually necessary, provided the contents of the package have been thoroughly sun-dried and the covering is rendered perfectly air-tight by sewing on a second covering of gunny and tarring it thoroughly.

When pieces of leather work are fixtures to cloth saddles, jhools, etc., the leather should be well dubbed previous to packing.

(Para. 1936, Vol. V.) All gear in use and in store should be kept in saddle rooms. It is more satisfactory to have a small saddle room for each jemadar with pegs for 50 saddles round

Saddle rooms.

the walls. Under this system he can keep his gear, cleaning materials, etc., under lock and key.

In large saddle rooms the gear of different troops get mixed up, and the responsibility for losses cannot be fixed. Two small rooms can be allotted to a draught jemadar who has 100 animals in his charge. And as he has also to look after his carts and draught harness, it is better that he should hand over fifty animals and their gear to each of his duffadars, he being, of course, held responsible for the efficiency of his command.

Care of harness and saddlery.

The following instructions have been approved for insertion in Vol. V :—

(1) All saddlery and harness in use should be laid by in dubbing once a month on a Saturday afternoon till the same hour on Sunday, when it should be cleaned up ready for inspection on Monday.

(2) Spare harness and that of sick animals in store should be similarly cleaned and dubbed.

(3) As dubbing spreads more uniformly and becomes more thoroughly and quickly incorporated into the fibre when the leather is damp, each part of the harness after being taken to pieces should first be separately cleaned with a rag damped in luke-warm water, after which the dubbing should be lightly and quickly rubbed in.

(4) In cold weather the dubbing should be warmed.

(5) Seats and flaps of ridding saddles should only be very lightly dubbed once a quarter, but a monthly soap-sponging is necessary to preserve the grain.

(6) Pack saddle pads should be soap-sponged weekly, but all harness in constant daily use and much exposed requires to be so cleaned daily, more to keep the leather soft and mellow than with the object of producing an outward gloss.

(7) Leather should never be soaked in water, least of all in hot water, which destroys its vitality, causing it to crack when bent.

(8) For sponging leather, luke-warm water should be used in preference to hot or cold.

Water from a shallow trough that has been exposed to the sun is sufficiently warm for the purpose.

(9) Leather articles exposed to the action of ammonia, which is continually given off in stables, become weak and rotten sooner than those not so exposed. But grease or dubbing applied from time to time penetrates the leather, nourishes it and fits it to resist the deleterious effects of stable ammonia and atmospheric moisture. It also fills up the fibres, makes the leather more mellow and increases its tensile strength.

(10) Soft soap contains an excess of alkali and should only be sparingly used ; if applied in excess, it gives the leather a dark and sodden appearance.

N.B.—Transport being seldom requisitioned for on Sunday by corps, that day is the most convenient for laying harness in dubbing.

Use of soft soap.

Soft soap is best used by making it into a lather with warm water in a bucket and then sponging the saddlery with it. After the soap has dried on the leather, it should be rubbed in with a dry cloth.

Composition of dubbing.

Dubbing is composed of equal quantities of Neat's foot oil and tallow boiled together and skimmed for five minutes. When nearly cool, a small quantity of turpentine or powdered camphor is stirred in, the smell of which will keep off flies.

We must be careful that the oil used is really Neat's foot. Cheaper oils, which blacken and destroy the leather, are often substituted.

The scale of dubbing allowed for leather articles is shown in para. 2046, Vol. V. A slight increase for draught mule gear is now under consideration.

Condemned gear—Commissariat supply.

Para. 1937 gives the rules under which gear of Commissariat supply is condemned and disposed of.

With reference to this, it may be remarked that, with the exception of baskets and brooms, no definite periods of duration are laid down in the new lists of gear (Vol. V, Appendices 43, 45, 46, and 48 to 51).

Condemned gear of Ordnance supply.

Gear of Ordnance supply is indented for on Indian Ordnance Form No. 278 in duplicate.

Ordnance gear is surveyed half-yearly during May and November by Commissariat Transport Officers (paras. 77 and 201, A.R.I., Vol. III). The result of the survey is embodied in Indian Ordnance Form No. 272 and is sent to the Inspector-General of Ordnance of the Circle, who gives directions for the disposal of the unserviceable gear and sanctions any extra repairing materials required for extensive repairs of the gear which has been surveyed (para. 832, A. R. I., Vol. IV, Part II). The iron work of the condemned gear is generally ordered to be returned to the nearest arsenal, the remainder being sold by auction by the Commissariat Transport Department. The unserviceable gear is replaced by the Ordnance Department, indents being prepared half-yearly on T. O. Form No. 278 on the 1st June and 1st December.

Indents submitted on other dates will not be complied with unless they are marked "emergent" and countersigned by the Officer Commanding the station (paras. 68 to 73, A. R. I., Vol. III).

Periodical returns of gear—Ordnance and Commissariat supply.

The returns of gear to be furnished by Regimental and Departmental Transport Officers are detailed in para. 1817-A, Vol. V.

LECTURE XVI.

Pack Saddles.

The Backs of Pack Animals. Weight-bearing Surface. Pack Saddles of various descriptions. Fitting and Stuffing Saddles. Fitting Saddlery. Temporary protection of Saddle Galls.

(NOTE.—To illustrate this lecture, patterns of the various saddles described are required, and the stuffing and fitting should be done before the class, also saddling and unsaddling. Afterwards one set of Ordnance saddlery can be given to every two Officers or Non-commissioned Officers. The saddlery should then be taken to pieces and separated, the upper halves of the pads emptied and the wool laid out on the tarpaulin. The wool should then be hand teased and the pads re-stuffed. A piece of wood 18 inches long by 1 inch broad and a quarter of an inch thick should be given to each member of the class to work the wool into the corners of the pads. The stick to be slightly forked at one end with blunt prongs ½ inch long. When the pads are suitably stuffed, the saddles should be put together and fitted in accordance with the instructions given. The mules should then be filed past the instructor and all defects pointed out and rectified. Sundka, chahl, and camel, bullock and donkey saddles should also be fitted by the class and defects noted and altered. An illustration should also be given showing how to protect a small gall from the pressure of the saddle.)

Conformation of the back.

The dorsal column of an animal consists of a line of small bones bound together by ligaments. Each of these bones has two ribs attached to it—one on each side—and also a bony process on the top called a spine (see skeleton in Lecture VI).

Covering and protecting all the above bones are muscles, skin and hair. The bony processes which grow upwards from the vertebræ between the shoulders are long and but slightly protected ; consequently they are easily injured.

Behind the shoulder they are much shorter and are protected by a thicker layer of muscles.

The ribs between the shoulders are flat and run down nearly straight from the spinal chain to the breast bone.

Behind the shoulder the ribs become rounded, and there is a flat weight-bearing surface on each side of the back bone.

The vertebræ of the loins are not made to bear weight as they have no ribs to support it, and pressure on the loins is very liable to cause injury to the kidneys. It is therefore evident—

(*a.*) That the withers are not made to carry weight, as the ribs here have no weight-bearing surface, and any pressure on the upper surface would result in injury.

(*b.*) That the real weight-bearing portion of the back is the flat surface on each side of the back bone from behind the play of the shoulder to the beginning of the loins.

Weight-bearing surface.

This surface in the average pack mule or pony is about 1 foot long and 3 to 4 inches broad on each side. In the donkey it will be less.

In the camel the surface will be double the above measurements and in the elephant they will be nearly quadrupled. A really good pack saddle for any

animal should therefore be manufactured on the principle that the real weight of the load will be supported by the true weight-bearing surface, but at the same time, to secure rigidity and stability, a moderate pressure may be applied to the sides of the dorsal ridge and on the portions of the ribs immediately below the true weight-bearing surface.

Pack saddles in India.

The pack saddles used in India for mules, ponies, bullocks and donkeys may be divided into three classes:

(*a.*) *The Ordnance pattern saddle* at present used for Government mules and ponies, which has a tree formed by two iron arches fixed to wooden side-bars and stayed by two iron rods running from the front to the rear arch.

The side-bars are secured to two leather pads lined with serge and stuffed with wool.

(*b.*) "*Súndkha*" *saddles*, in which the weight is kept off the back bone by a long roll called a súndkha, which is made of gunny and stuffed with long grass; the middle of the roll passes in front of the withers and the two ends are brought back on each side of the back and loins. Over the súndkha is fastened a pad to protect the ribs from the pressure of the load. In some of these saddles the súndkha is divided and consists of two short rolls pressing on the proper weight-bearing surface of the back.

(*c.*) *Single or double pads.*—The former fully stuffed over the weight-bearing surface and hollowed over the backbone—the latter with the pads joined together over the backbone by pieces of stout webbing.

The present Ordnance pack saddle is the result of various experiments and trials, but it still causes sore backs, and further improvements are now contemplated. At the time of the last Afghan war the iron arches of the tree were continued down to the lower edge of the pads. This was found to be unsatisfactory, as the fixed iron arches could not accommodate themselves to the expansion and contraction of the chest, and they pressed on the sides to such an extent as to impede the surface circulation.

Ordnance pack saddle.

The result of this was that large hard sit-fasts formed under the saddles at about the spot where the girth straps meet the girth buckles.

The healing of these sit-fasts was very slow; the dead skin had to be poulticed before it could be removed, and in many cases the animal was thrown out of work for two or three months.

The continuations of the iron arches were accordingly removed.

At this time the wooden side bars were straight and, there being no generally recognized method of fitting and stuffing saddlery, the saddles were allowed to slip forward on to the animal's withers, which were galled by the pressure caused by the straight side bar, and many cases of fistulous withers occurred.

The straight side bar was then abandoned and a curved one instituted the convex surface resting against the animal's back.

The curve was, however, so arranged that the whole pressure of the load was sustained by a space about three inches square in the middle of the weight-bearing surface.

Moreover the fact was not taken into consideration that the mule, instead of having a slightly hollow back like a horse, is inclined to be roached in that part, a conformation calculated to reduce the weight-bearing surface to a minimum when a curved side bar is used. The result of the curved side bar is indelibly illustrated on the back of every transport mule worked previously to 1891. In the centre of the weight-bearing surface will be formed either an old scar or white hairs, the result of undue pressure on this particular spot. Accordingly the curved side bar was rejected and the straight one re-introduced.

This gives a uniform pressure over the weight-bearing surface, and as long as the saddle is kept behind the withers, the results are satisfactory. The conformation of a mule's shoulders, withers and belly is however such that there is a constant tendency for the saddle to slip forward, and when this happens, there is great danger of the withers being bruised by the ends of the straight side bars. When going up steep hills there is also the probability of the rear ends of the side bar pressing unduly on the loins and injuring the kidneys.

Side bars with modified curves.

To remove this objection, it has been proposed to give a slight curve to the front and rear ends of the side bar, leaving it perfectly flat for about 9 inches in the middle, so that it will press evenly on the weight-bearing surface of the back. Samples of these improved bars are now under trial.

The trees of the Ordnance saddle are issued in three sizes to suit the different widths of backs.

The Ordnance saddle pad is faced with stout leather. Along its lower edge is sewn a leather strap, to each end of which is secured a hook to receive the breeching and breast-piece chains.

New saddles under trial.

Two other saddles similar to the Ordnance pattern are now under trial.

One, invented by a Naval Officer, has jointed arches which open and close to fit the backs of different animals, and the pads are lined with layers of cork, a numdah being first placed underneath them.

Marriott-Allen saddle.

The second (the Marriott-Allen saddle) has the present Ordnance pattern tree, but the pads are made of corrugated India rubber and can be inflated with air or filled with water.

This ought to be a valuable improvement if the hollow pads can be made strong enough to stand continued pressure without bursting.

Súndkha saddles.

Sundkha saddles in various shapes have been tried for transport work, but have not been found satisfactory.

A great deal depends upon the súndkha being kept in thorough repair and properly adjusted under the pad.

When these points are well attended to, the súndkha saddle answers admirably, but it seems impossible to impress upon our present class of driver the necessity of attending to these details, and regimental supervising establishments seem unable to cope with the difficulty. A carelessly fitted súndkha, or one in which the rolls have shifted and do not rest on the weight-bearing sur-

face and thus protect the spine, is sure to give a sore back, and the results of using this description of saddle for military transport have been for the most part disastrous.

Single pads of different descriptions have also been used for pack work, but have never been found satisfactory. The sides of the pads lying over the weight-bearing surfaces are stuffed so as to protect the spine, but without constant care and skilful adjustment the stuffing gets pressed down, the pad is pulled out of shape and the spine is galled.

Pack pads.

The American Aparejo pad, described by Furse on pages 287—290, is an exception to the above rule, **but in America pack animals are always placed in the hands of skilful packers, who thoroughly understand the whole business** and the elaborate care and adjustment required for working the Aparejo and described by Furse would preclude its use for Indian Military Transport.

Double or divided pads are, however, more satisfactory.

A new one has been lately introduced called the "Cháhi" saddle.

Cháhi saddle.

The pads are composed of quilted numdah about 4 inches thick over the weight-bearing surface and fining down to a thickness of 2 inches at the lower edge.

The sides and back are further protected by a saddle cloth made of numdah, which is placed underneath the double pad.

The spring and protection offered to the weight-bearing surface by this quantity of numdah should effectually protect the back and sides from galls and bruises.

For donkeys the ordinary súndkha saddle is still in use and answers fairly well.

Donkey saddles.

A small saddle on the "Cháhi" pattern would probably be very successful for these animals.

The manufacture of pack saddles for Indian bullocks presents very few difficulties.

Pack bullock saddles.

The animal has a broad, flat, weight-bearing surface on each side of the spine, which is not prominent as in the average mule or pony.

In the place of the delicately-constructed and badly-protected withers of the latter animals, there is the elastic muscular hump, and the bullock's thick skin is less likely to become bruised and galled than is that of thinner skinned animals. Various patterns of bullock saddles are used. They are generally made on the súndkha principle and answer well.

We now come to the important question of stuffing and fitting the Ordnance pack saddle.

The first point to notice is that a saddle cannot fit an animal well unless the tree is so fashioned that the lower surfaces of the side bars coincide with the formation of the weight-bearing surface of the back. To effect this, the front and rear arches must be so adjusted that the side bars rest on their proper place.

Fitting the Ordnance saddle.

If the front arch is too narrow, the withers are likely to be pinched. If the rear arch is too narrow, the saddle is pitched up behind and the weight of the load is thrown on to the withers ; if it is too broad, the rear end of the saddle is depressed and undue weight is thrown on the loins.

If both arches are too broad, the weight of the load presses below the proper surface, and side sores will most likely be caused. We must also remember that some animals have broad backs and some narrow, and that the slope of the side bars must be adjusted to suit these formations.

Having selected a suitable saddle tree, it now remains for us to protect the back and sides from the pressure of the side bars and the load.

This is effected by securing a stuffed pad to each side bar.

Ordnance saddle pads.

These pads are lined with serge and have a pocket on the leather face to allow of the wool being constantly re-adjusted.

On the front upper corner of each pad is a pocket which admits the front end of the side bar, the rear end of which is secured to the pad by two straps fastened to the rear corner. These straps should be secured to the pad, or they will be constantly lost.

For lining a saddle pad 24″×18″ of serge is required.

For stuffing, about 6 pounds of wool is required for each pad.

Wool.

As regards wool, it is still an open question as to whether a long or short staple is best, but it is a matter of the greatest importance that the wool should be thoroughly clean and free from all foreign matter.

The purchase of bad wool at cheap rates is very poor economy. All wool will form into lumps inside the saddle if it is not frequently hand-teased, but we require between the side bar and the animal's skin a thick layer of springy wool which will save the back from galls and bruises and help to neutralise jars.

Adjustment of wool.

After the wool is put in, the lower half of the pad is quilted and the upper half should then be well stuffed, the wool being worked into the corners and so adjusted that the saddle will be perfectly level on the back.

For an animal in good condition it is a good plan to sew the lining on to the pad about an inch below the original insertion on the upper edge, increasing the distance to one-and-a-half inches in front so as to minimise the pressure on the withers.

Should the animal afterwards lose condition from sickness or the exigencies of field service, this stitching can be opened up and additional wool put in to increase the protection to the back.

Before putting the saddle together, the serge surface of the pads should be levelled by punching them with the fist, and they should then be secured to the tree.

Fixing component parts of saddle.

To put a saddle together ready for use—

Fasten the girths to the girth straps on the off side of the tree and lay the girths over the saddle.

Attach the off chain of the breast-piece to the off-hook of the saddle pad and lay the breast-piece over the saddle just behind the front arch.

Attach the off-chain of the breeching to the off-hook of the saddle pad and lay the breeching on the saddle just in front of the rear arch.

Secure the crupper to the crupper ring, bring it over the rear arch and pass it under the front arch.

The saddle is now ready to be put on the animal's back, and we will now consider some rules for fitting the saddlery of a mule or pony ; but at the same time we must remember that they are not all built on the same pattern and that discretion and judgment must be exercised in carrying out the rules.

The fitting of the head collar has already been fully explained in the Lecture on Stable Management.

Fitting saddlery.

Before saddling a mule or pony, the bridle should be put on.

When inserting the bit in the mouth, the animal should be induced to open his mouth by placing the hand on the tongue behind the incisor teeth.

The long head-piece of the bridle should be passed through the brow-band loops on each side and fastened to the buckle end on the near side.

We may here remark that it is usual to handle animals and adjust all straps, chains, girths, buckles, etc., as far as possible from the near side, the reason probably being that a horseman travelling on the near side of the road would naturally dismount and mount on that side and could make any adjustment of his bridle, girths, etc., without leaving the side walk.

Animals are handled from the near side as far as possible.

In adjusting the head-piece of the bridle, we should tighten it till the bit touches the corners of the mouth, but does not wrinkle them. There is no advantage in having the bit tighter than this, as it would only inconvenience the animal, and the proper place for the bit to press is on the sides of the mouth between the incisor and molar teeth and one inch above the tushes in males.

Fitting the bridle.

Mule orderlies for departmental work are often allowed to use very severe bits of which they manage to possess themselves. It is a great mistake to allow this.

Mule orderlies.

The ordinary watering bit is quite sufficient for an orderly's work, and with this bit he is afraid to gallop his mule on the roads.

Mule orderlies should, as a rule, go at a walk and only trot when carrying an urgent letter. They should never be allowed to gallop their mules. A mule is not built for fast work and is easily lamed if ridden at speed. A few lessons in the lines will make a mule quite handy for slow work in a snaffle bit.

The position of the saddle is the next point to consider, and we must remember that we want the pressure of the pads and side bars to be sustained, as far as possible, by the weight-bearing surface.

Position of the saddle.

The saddle should therefore be placed on the back, so that its front will be clear of the withers and the play of the shoulder.

Frequently however, owing to very low withers and straight shoulders, the saddle will not retain this position, but shifts forward notwithstanding the breeching, crupper and tight girths.

We have next to consider the fact that the saddle must rest perfectly level on the back, and this is achieved by good and careful stuffing.

Saddling. If a saddle is too high in front, the pressure will not be even and the weight of the load will be concentrated on the loins.

On the other hand, if the saddle is stuffed too much behind and is too low in front, the withers will be subjected to undue pressure.

These are points which should come under our daily notice both in cantonments and on the march, and defects should be at once rectified.

The saddle must be placed gently on the animal's back from the near side, and not thrown on so as to frighten him.

The crupper should now be adjusted, the saddle being shifted back slightly and afterwards replaced in its proper position. Hold the tail firmly, standing in front of the hind legs, and pass the crupper over the tail, taking care that no hair is gathered underneath the crupper, which, when adjusted, should admit of the breadth of the hand being inserted between it and the croup.

Fitting the crupper.

Girthing. Next throw the girths over to the off side of the saddle and they will swing under the belly to the near side.

It is an open question as to whether the girths of a mule pack saddle should be crossed.

As a rule mules carry big bellies, and it will be found that by crossing the girths under the belly they can be kept back in their proper place well behind the elbows, and this will materially assist in keeping the saddle in its proper position. When girths lie too far forward, they are very likely to cause galls. Before tightening the girths, the saddle pads should be separated over the spine. This is done by holding each pad at its lower edge and pulling them first outwards and then downwards so as to take the curve of the animal's ribs. This is specially necessary with new pads.

When tightening the girths, one hand should hold the girth strap and with the other the top of the near pad should be held down, to prevent it rucking up during the process of girthing. Always girth very tightly, as the girths will slacken when the load is put on.

Fitting the breast-piece. Considerable care and judgment are necessary in adjusting the breast-piece to a mule or pony.

The shape of the shoulders and breasts of individual animals varies to such an extent that it is difficult to lay down definite rules. The breast-piece must be so adjusted that it will not press on the gullet, and it must not be so low that it will hang below or gall the point of the shoulder.

The height of the breast-piece is regulated by the neck strap, which buckles on the near side.

As a rule the breast-piece will be properly adjusted when the lower edge is about two fingers' breadth above the sharp breast bone, which can easily be felt in the middle of the breast just below the point of the shoulders.

Fitting the breeching.

The breeching, which prevents the saddle from slipping forward, requires, as a rule, to be fitted in a line with the breast-piece. Its position is regulated by the croup strap.

The breast-piece and breeching, when fitted, should admit of the thickness of the hand being passed round inside them. They are tightened and loosened by chains which are secured to hooks on the saddle pads.

To adjust these chains, the following rules should be observed.

Twist up the chain until it lies flat, pass the outside of the last link through the hook on the saddle pad, draw the chain over the hook until sufficiently tight, then hook on one link from the inside. The breast-piece and breeching will generally be properly adjusted when a slight pressure is required to pass the latter link over the point of the saddle hook.

By adjusting the chains in this manner, the spare ends do not hang down and jingle when the animal moves.

Breeching and breast-piece on the march.

On the march, when an up-hill journey has to be accomplished, the fitting of the breast-pieces requires most careful attention.

When going down-hill, we should be careful that the breechings are properly adjusted, sufficiently tight, and not so high as to allow of the possibility of their slipping up under the tail.

Fitting straps.

All straps should be fitted into the leather keepers and runners, and all long ends cut off to a reasonable length.

The end of the crupper strap can be rolled on the top of the croup if preferred.

Unsaddling.

To unsaddle a mule or pony equipped with the ordnance saddle, the girths and breast-piece chains should first be loosened and the saddle shifted back to allow of the crupper being removed.

The girths should be drawn over the top of the saddle, and the breeching, breast-piece, and crupper placed in the same position as before saddling, the neck-strap being first unbuckled.

The saddle should then be gently lifted off from the near side.

Loosening girths.

It will not be out of place to mention here that **girths (especially with young or soft animals) should be gradually loosened so as to prevent swelling.**

In Mountain Batteries, where some of the mules have to be girthed very tightly owing to the heavy top-loads they carry, the girths are only let out one hole at a time after a march and are not really loosened until two or three hours after the animal has come in.

Saddles should not be taken off until the backs have cooled underneath them and this fact will be emphasized in a future lecture regarding management of animals on the march.

Temporary Protection of Saddle Galls.

All the above principles apply to the fitting of súndkha and cháhi saddles, also to bullock and donkey saddles. **Great care must be taken that rolls and pads are so adjusted as to protect the spine from pressure, and neglect to do this will inevitably result in sore back. Always insist on each animal having its own saddle, and these should never be changed unless it cannot possibly be avoided.**

Fitting súndkha, cháhi, bullock and donkey saddles.

The fact must now be considered that various articles of line-gear have to be carried in addition to authorized loads.

Line-gear, etc., how carried.

When a mule or pony equipped with Ordnance saddlery is turned out for the march ready to receive his load, he is already carrying about 60 pounds.

This weight varies according to different manufactures of gear.

The following is a good method of carrying the equipment:—

Carrying line-gear on the march.

By each mule.

The fore-foot shackle to be fastened to the rear D of the head collar, the fore-foot chain being passed round the neck and secured. The jhool to be folded 5′ by 15″ and passed over the saddle so as to lie between the front and rear arches of the saddle.

The heel chain with hind-foot shackle to be hung on the hooks of the saddle tree.

The two iron picketting pegs for each mule to be carried in the nose bag, which should be fastened on after the load has been adjusted.

As a rule, one of the loads is slighty heavier than the other, and the nose bag and pegs, when added to the lighter load, will help to adjust the weight.

The brush, curry-comb, sickle and canvas bucket to be packed in the forage net and carried by the strongest of the driver's three mules. The tarpaulin to be carried over the load by the next strongest mule.

Notwithstanding previous careful adjustment of stuffing, saddle galls will sometimes occur owing to the animal being in soft condition or to his losing flesh.

Temporary protection of saddle galls.

If possible, he should be thrown out of work at once and not used for pack work until the wound has healed, but in cases of necessity the wool can be so re-adjusted as to prevent the sore being pressed on and thus lessen the chance of the gall extending.

Smear a little oil or ghee over the sore and put the saddle on in the proper place.

On removing the saddle, the oil stain on the serge lining will show where the saddle presses on the sore, and the wool should be removed from immediately above this mark.

The serge should then be sewn down to the leather face of the panel with 8 or 10 long stitches, a circular hollow being thus made immediately over the wound.

A piece of soft cotton or linen cloth saturated with the application which is being used for the sore should be applied before the saddle is put on, and this will be a further protection.

LECTURE XVII.

Transport Waggons and Carts—Principles of Draught. Draught Harness for Transport Animals. Bullock Draught. Breaking Mules and Ponies to Draught. Transport of Carts by Rail and Sea.

(NOTE.—Mule and bullock carts as detailed in the lecture are required for illustration, also mules with draught harness and bullocks to illustrate the driving rules. The component parts of the different carts can be practically explained and an iron nave taken to pieces.)

Cart transport for Indian armies.

It is only of late years that cart transport has been used to any extent by Indian armies on field service.

Hitherto its use has been attended by many difficulties, and it remains to be seen whether, under the improved arrangements which have been in progress during the last few years and are now nearly complete, we shall be able to work draught transport satisfactorily on an extended scale in the field.

The advantage of using our animals in carts is that they can thus convey at least twice as much baggage, etc., as they can carry on their backs, and on metalled roads in fine weather this calculation can nearly be doubled.

In order, however, to provide against bad roads and wet weather, the weight authorized to be carried in transport carts has been fixed at a very low scale.

Thus a two-wheeled cart drawn by two mules or ponies carries 8 maunds, and one drawn by two bullocks, 10 maunds.

To secure a suitable transport cart for service, we must combine the following conditions :—

1. Simplicity of construction.
2. Unimpaired utility in extremes of climate.
3. Lightness and easy draught.
4. Strength.
5. Sufficient space for stowing the authorized amount of military baggage.
6. Component parts to be interchangeable.
7. Adaptability to either mule and pony or bullock draught.
8. It should be easily portable by sea or rail.

Various patterns of carts have been tried, but we have not yet arrived at the ideal vehicle combining all the above qualities.

In the Afghan war of 1878—80 several different carts were brought into use.

Carts in the Afghan war.

They were for the most part strong in appearance and of fairly easy draught, but owing to defective manufacture and the use of unseasoned wood, they came to pieces in the very dry climate of Afghanistan.

After the Egyptian war of 1882 a number of four-wheeled Cape waggons were imported into India.

Cape waggons.

They were of excellent construction and answered well on metalled roads, but with these waggons it was found that ten mules were required to draw a load of 30 maunds on an unmetalled road, and in wet weather the waggons, owing to their weight and heavy draught, could not be moved off a well-made road,

Transport Carts.

During the last eight years several patterns of two-wheeled carts have been constructed and tried, and we are now in possession of a cart combining to a certain extent all the good qualities above detailed, with the exception of its not being adapted for interchangeable mule or bullock draught.

This addition is an important consideration, and steps are now being taken to complete it.

The present Army Transport cart.

The present pattern of Army Transport cart consists of the following component parts :—

Axle, with axle arms.
Wheels, consisting of nave, spokes, felloes and tyres.
Axle bed.
Side and *centre bars.*
Front and *rear bars.*
Six cross bars.
Pole, with pole ring, shank, and curricle bar.
Iron sides, with front and rear chains.

There are several patterns of this cart, varying slightly in design.

The following statement gives the main points of difference :—

Bengal pattern—

Mark I has stouter side bars than the Bombay cart, has iron sides and the wheels (4 feet high) have wooden naves.

Mark II has lighter side bars similar to the Bombay cart, has iron sides, and the wheels (4 feet high) are fitted with the Bombay pattern cast-iron naves.

Bombay pattern—

Mark I has wooden sides.

Mark II has iron sides with a driver's seat.

Both these marks have a wheel 4 feet 4 inches high, with a Bombay pattern cast iron nave and a track 4 feet 6½ inches broad measuring from the inside of each track. All the above patterns are at present fitted for mule draught only.

There is a standard *Army Transport Bullock Cart* in the Bengal Presidency with a split pole.

The wheels (4 feet high) are at present fitted with wooden naves.

It has lately been decided that in future all Army Transport carts for bullock, as well as for mule and pony draught, are to be fitted with the Bombay pattern cast-iron nave.

Axle.

The axle supports the whole weight of the cart and load.

The axle of every pattern of Army Transport cart is made of 1¾ inch square wrought iron.

Axle arms.

The sizes of the axle arms are as follows :—

Bengal pattern for wooden naves ; axle arms cylindrical 1⅜ inch diameter and 1 foot long.

For the Bombay pattern iron naves, the axle arms taper from 1¼ inch to 1½ inch in diameter and are 11 inches long.

An iron shoulder washer is also shrunk on the inside of the axle arm, and on the outside is a drag-washer, also a lynch-pin with chain attachment.

Wheels.

The essentials in a wheel are—

Strength, attained by the use of strong and seasoned materials and evidenced by the close and secure adjustment of the component parts.

Symmetry, attained by the accurate sizing and fitting of each component.

The draught of a cart is considerably influenced by the size of the wheel, which should be sufficiently high to admit of the bottom of the frame and the shoulder draught of the mule or pony being nearly in a line. The faster the pace required, the higher should be the wheel.

Line of draught.

In a bullock cart the pace of the animal is slower than that of a mule or pony. The line of draught is generally lower, and for these reasons smaller wheels can be used.

A suitable height of wheel for a 2-wheeled cart for mule or pony draught is from 4 feet 4 inches to 4 feet 6 inches.

For bullock draught, from 4 feet to 4 feet 4 inches.

Naves.

The nave of a wheel is an important consideration. Wooden naves are very liable to split and are now being superseded by those of cast iron. Every nave requires a metal lining to protect it from the friction of the axle arm. This lining is called a pipe-box.

Pipe-box.

The cast-iron nave now in use consists of an inner flange, an outer flange, a pipe-box (conical) and 12 bolts and nuts connecting the inner and outer flanges. These nuts can be tightened when the shrinkage of the spokes renders it necessary.

Each pipe-box has a recess on the inside, which forms a reservoir for the grease used to lubricate its interior lining.

Spokes.

There are 12 spokes in an ordinary wheel. For Indian transport carts, spokes are made either of Bábul (Acacia) or Pedook (Andaman Wood). They should be of straight grain, free from knots, and well seasoned. With the cast-iron nave it is most essential that the feet of the spokes should be so fitted on the pipe-box between the flanges as to form a complete and solid circle, also that the "tang" or top of the spoke should fit easily and accurately into the hole in the "bosom" of the felloe.

As regards strength, suitable dimensions for spokes are ;—at foot $2\frac{5}{8}$ inch broad by $1\frac{3}{8}$ inch deep, and—in the centre $2\frac{1}{2}'' \times 1\frac{3}{8}''$. The length of spoke depends on the height of the wheel.

Felloes.

The felloes are the blocks of wood which form the circumference of the wheel. The usual number in a wheel is six.

In India they are are made of bábul and each felloe should be truly turned so as to form an arc of one-sixth of a circle.

The convex surface of a felloe is called the "sole," and the concave surface the "bosom."

For a two-wheeled Army Transport cart, felloes should be three inches broad at the bosom, $2\frac{1}{4}$ inches broad at the sole and $2\frac{1}{2}$ inches deep.

Transport Carts.

The tyre of a wheel for a baggage cart is made of flat iron generally 2½ inches broad and half an inch thick.

It is welded into a circle of the correct dimensions and put on to the wheel when at a red heat. It is then cooled with water, and by its contraction compresses and tightens the whole wheel.

Axle-bed, frame and pole.

The frame of the Army Transport cart, the axle-bed and pole are generally made of teak.

The axle-bed rests on the axle and is secured to it by a centre bolt and side clamps.

The axle-bed raises the frame of the cart to the required height.

The frame is composed of side and centre bars, front and rear bars and cross bars.

The side bars are secured to the axle-bed by double bolts, and the centre bolt, which passes through the axle-bed, also takes in the centre bar.

The front and rear bars and cross bars are secured by bolts to the side bars and by screws to the centre bar.

The pole is fitted with a shoe ending in a loop which is fixed on the centre bolt under the axle-bed. The pole is then fixed to the centre of the front bar by double clamps.

Pole.

The Army Transport carts have removable iron sides, and each cart is fitted with a spanner and a grease tin carried on the rear face of the axle-bed.

The proper care of carts is an important consideration. It must be remembered that in dry weather, wood is inclined to shrink, and that in damp weather it swells.

Care of carts.

Hence it is necessary to keep all bolts and nuts thoroughly tight, particularly those of the pole-clamps and naves.

If this is not done, the cart is liable to become shaky.

Tightness is essential to durability in a cart. The strongest-built cart becomes weakened if its components are allowed to work loose. Wheels should be re-tyred as soon as they become shaky.

If a loose wheel is kept in use, it soon becomes spoiled as the wooden spokes wear away against the iron flanges of the nave.

In connection with the tightening of bolts and nuts, it may be mentioned that the centre bolt, pole-clamps, and pole ring shank are fitted with double nuts.

Check nuts.

The second nut is called a check nut, and, if properly put on, gives great security.

The first nut should be screwed tight ; the second nut should next be screwed tightly up to the first. The check is then performed by holding the second nut firmly with a spanner. A second spanner is then applied to the first nut, which is twisted back slightly on to the second nut ; this causes a complete jam, and it is almost impossible for double nuts to work loose if fixed as above described.

In fixing nuts on the pole ring shank, space must be allowed for the curricle bar to work freely underneath the nuts, which should be securely jammed together above the bar. If this is not attended to, the nuts sometimes work

loose and allow the pole to drop to the ground, often causing serious injury to the mules' feet.

Draught harness.

For mule and pony draught, the animals are fitted with rope traces covered with leather similar to those used for Artillery horses. At one end of the trace is a hook for insertion into the staple of the draw bar, and at the other are nine links to allow of the trace being lengthened or shortened according to the size of the animal.

Arch attachments.

Draught breast-piece.

The pack saddles are fitted with an arch attachment to receive the curricle bar, and the pack breast-piece is strengthened with a strapping of strong leather and provided with hooks to receive the trace links.

Various kinds of arch attachments have been tried, but as yet no definite pattern has been fixed.

The essentials for a draught attachment are that it should be of simple construction, strong, low and well forward on the saddle. Strength and easy application of the pin for securing the curricle bar to the attachment are also important considerations.

If the attachment is easily removable from the saddle, so much the better.

Deficiency in one or more of the above points has caused the rejection of several patterns which have been tried.

The adaptability of the Ordnance saddle to both draught and pack work has been insisted on by the Government of India, so that, in the event of carts breaking down on service, the animals would be ready fitted with pack saddles and work could be carried on. The objection to this system is that the pack saddles are cumbrous for draught work.

It was thought at one time that transport carts could be drawn from arch attachments without traces, but this system was found after a short trial to be impracticable and traces were adopted. The draught from the top of the back is too catchy for laden carts moving at a slow pace, and animals and harness suffered accordingly.

Curricle draught from the back.

The curricle draught without traces seems to answer with tonga ponies moving at speed on good roads, but the animals suffer from galls caused by pressure from the rear ends of the saddle pads.

It is essential for easy draught with a breast-piece that the two points at which the trace is secured to the animal and the cart should be nearly level. A slightly upward draught is better than a downward bearing. If, however, the line of draught is too high in front, a heavy strain is brought on the neck strap.

Breast-piece draught.

If the draught is downward, extra weight is drawn on to the animal's back and the breast-piece is drawn up and is liable to press on the larynx and impede breathing.

The present Army Transport mule cart is so adjusted that with the average 13 hands draught mule the line of draught from draw-bar to shoulder is almost level.

Driving and Breaking Rules.

The scale of draught harness allowed for mules when used with carts is shown in Vol. V, Appendix 48.

Driving bits.

No definite pattern of bit has yet been adopted. Artillery driving bits have been used, but they are too big for mules and too powerful for use with the present class of mule driver, who is generally very heavy handed.

Driving whips.

The pattern of whip to be used for draught mules and ponies has not yet been decided on. Strength is required particularly at the point of attachment of the thong to the wooden handle. A satisfactory whip is made by rivetting an iron staple to the end of the handle and sewing on the loop of the thong, which should be of double thickness at this point. This will prevent losses of thongs, which otherwise constantly occur.

The handle should be about 2 feet 6 inches long and $\frac{3}{4}$ of an inch in diameter.

As regards breaking animals to harness, the following rules taken from the Standing Orders of the Poona Transport Depôt will afford some useful information.

The drivers are clumsy to begin with, but a few lessons with a proper system of instruction makes a wonderful difference.

Rules for Driving and Breaking in Mules and Ponies to Draught.

1. In breaking a mule to draught, it is best at first to put him into a four-wheeled waggon with Cape harness, when available, with a strong quiet mule.

2. See that the pupil is lightly bitted and that the reins are evenly adjusted. Tie a rope to his bit as an extra precaution against his breaking away.

3. See that no part of the harness pinches or otherwise hurts him, especially that the breast-piece is soft.

4. See that all the gear is strong and not likely to break.

5. Put a careful driver in the waggon and have a sharp, active man at the pupil's head holding the rope.

6. Remember the following rules when managing a young animal :—

   (*a*) Keep cool yourself and handle the animal quietly.

   (*b*) Do not get excited when he kicks and jumps.

   (*c*) Do not rush at him, or snatch at his bridle, or jerk his mouth.

   (*d*) Do not shout at him, as this only excites him.

   (*e*) Leave his ears alone unless he is very obstinate and violent and cannot be otherwise held.

7. Let the trained mule start the waggon, touch the pupil lightly with the whip, and after a few plunges he will generally go quietly. Some mules will break well in a few days ; others want a month's training.

8. After each lesson, give the young animal some grain or green grass, and encourage and pat him while he is at work.

9. Be careful not to work the pupil long enough at one time to let him get galled. If his shoulders become at all tender, do not put him in again until the injured part is all sound.

10. As soon as a mule goes straight and quietly in a waggon, he can be put in the Army Transport cart (curricle draught). Here again see that all the harness fits him and that the breast-piece is soft. Have a steady mule put in with him.

11. When a mule is first put into curricle draught, he generally bears either inwards or outwards. Some mules get permanently frightened and cannot be cured of leaning against the pole. They also alarm the other mule, who is afraid of being pushed off his legs, and also leans against the pole. If a mule seems likely to be confirmed in this habit, it is best to put him back to pack work and break in a fresh animal, as the pusher often spoils other mules put in with him who have in self-defence to lean heavily against the pole to save themselves from being pushed off the road.

12. Young animals are, however, often cured in a few days by using the whip as explained in paragraph 19.

13. The driver should sit on the right side of the cart with the feet planted firmly in front of the body, using the wooden seat when the cart is empty or when the compact nature of the load allows of the seat being used.

When the stores are too bulky to allow of this, the driver will sit on the top of the load.

14. He will hold the reins in his left hand, the near rein between the fore-finger and thumb, the off-rein between the second and third fingers, thumb and fingers to be closed on the reins, the knuckle of the thumb pointed upwards.

Whip to be held in the right hand, pointing across the body.

15. To start the cart, ease the left hand, speak to the mules, and, if necessary, touch them lightly with the whip. Adjust the reins so as to have a level bearing on both the animals' mouths.

16. While the animals are in motion, feel their mouths lightly with the reins, keeping the left hand low down about 6 inches in front of the belt.

17. Keep the body and head upright, elbows close to the side.

18. If either of the mules hangs back, touch him lightly with the whip to bring him up to his collar.

19. If a mule bears in towards the pole, hit him on the inside of the loins with the whip to make him go straight. If he bears out from the pole, hit him on the outer side of the loins.

20. To stop the cart, catch hold of the reins with the right hand behind the left hand, slide the left hand forward about 15 inches along the reins and bring it back to stop the mules, keeping the hand down and close to the waist belt. If the animals have very hard mouths, the right hand may be used to catch the reins in front of the left hand after it has been brought back to the body. **Never try and stop mules by lifting the hands up to the face, but always shorten the reins and keep the left hand down.**

21. To start the cart again, let the reins run through the fingers of the left hand till they are the right length and start as before explained. In driving along a road, always keep well to the left side.

22. Turning. Many mules have hard mouths and do not turn easily. In consequence the whip has often to be used to drive the mules into their bits and make them answer the rein.

23. To turn to the right, slide the right hand 18 inches down and above the right rein; close it on the rein and draw it back towards the body until the mules answer to the rein. If they do not answer, pass the shortened rein which is in the right hand between the forefinger and thumb of the left hand and hold it there without loosening the original grip of the reins. Then hit the near side mule with the whip, and they will both come round to the right. As soon as they have turned sufficiently, let go the loop of the right rein by loosening the grip of the forefinger and thumb of the left hand. Both reins will now be equal and at their original length, and the mules will go on straight.

24. To turn to the left, slide the right hand 18 inches down and above the left rein, close it on the rein and draw it back towards the body until the mules answer to the rein. If they do not answer, pass the shortened rein, which is in the right hand, between the forefinger and thumb of the left hand, hold it there without loosening the original grip of the reins. Then hit the off side mule with the whip and they will both come round to the left. As soon as they have turned sufficiently, let go the loop of the left rein by loosening the grip of the forefinger and thumb of the left hand. Both reins will now be equal and at their original length and the mules will go on straight.

25. With double reins it is most important that all four reins should be so adjusted as to have an equal bearing on the animals' mouths when they are pulling straight, *i. e.*, each animal straight in front of its draw-bar. The reins are adjusted at the buckle which joins each pair of reins together.

26. In going up hill, the animals' heads must be let loose ; when going down hill, the reins must be shortened in the hand and the animals kept moving at a steady pace.

27. **It is most necessary to impress on drivers that the best results can be obtained by treating the animals well, and that roughness and unnecessary dragging at or jerking their mouths can only result in failure.**

28. **The whip must be used with caution and should be lightly applied. Occasionally, when a slug requires to be brightened up, he may be given two or three sharp cracks, but for an honest-working animal the whip should only be used as a signal, and not as a punishment.**

Lubrication of pipe boxes.

The proper lubrication of the pipe-boxes is an important matter.

Any kind of grease will do, provided it is free from grit and of sufficient consistency. The greasing of wheels should be attended to at least once a week and oftener on the march, especially if the roads are dusty. On metalled roads, if well watered, about twelve ounces per month are required for a pair of wheels. On the march on dusty roads one pound per month is found necessary.

Bullock draught.

Bullock carts are drawn from the yoke fixed to the end of the pole.

For this draught it is obvious that the pole must be strong and securely fixed in the cart. If this is not attended to, the pole will fail under the heavy leverage which is exerted when the cart is turned on rough ground or when the wheels get into deep ruts.

Driving bullocks.

The art of bullock-driving does not come naturally to every one who attempts it.

Bullocks, which work well with a good driver, often become sluggish when handed over to an artist of inferior attainments. The native bullock-driver works with his tongue, hands and toes. In urging on his bullocks, he uses yells and abuse, alternating with clicks and coaxing words. His additional aids consist in tickling the bullocks between the hams with his feet, pinching their tails, pushing them forward, and a liberal use of the whip if other means fail. The shouting is unnecessary and is not allowed in Heavy Batteries where guns are drawn by bullocks.

Twisting bullocks' tails should not be allowed as it oftens causes serious injury to the bones of the tail, which sometimes sloughs off as a result of this cruel practice.

The bullock is, however, tough skinned, and with sluggish animals a liberal use of the whip is sometimes necessary to awaken them to a sense of their duties.

In considering the best method for the carriage of carts by rail, it must be

Carriage of carts by rail.

taken into consideration that this has to be accomplished under varying circumstances, and it must further be borne in mind that the carts must be put together as quickly as possible on reaching their destination.

We may suppose that in one case the carts will be sent on field service in the same train as the animals which are to draw them and either in charge of Transport Supervising Establishments or the Regiment to which the animals and carts are attached.

Under the above circumstances the carts should not be taken to pieces more than is absolutely necessary to ensure safe and economical storage in the waggons, and the small component parts do not require elaborate packing.

Under other circumstances carts may be despatched as goods by rail from one station to another in charge of the Railway authorities, and experience has shown that in these cases the neglect of careful attention to packing and storing has resulted in damage to the carts and deficiencies in bolts, nuts, clamps, draw-bars, etc.

In a late circular from the Quarter Master General in India, rules are laid down under which only 8 Army Transport carts can be stowed in a broad gauge waggon, but the fact is now under consideration that, by modifying these rules, from 16 to 20 carts can be safely packed in the same waggon.

The following systems of packing and loading carts have been found to answer :—

When in charge of Troops or Transport Establishments.

Detach the curricle bar, draw-bars and seat from the cart.

Take off the pole and remove the pole ring. Take off the wheels and replace the washers and lynch pins in the axle arm.

Separate the iron sides from the body and replace the bolts and nuts in the side bars. Lay the sides flat on the cross bars and tie them on securely with pieces of string.

Wrap the axle arms, washers and lynch-pins in straw and cover with pieces of gunny secured with string. The body and sides form the first package; *second and third packages*, the wheels.

Fourth package; collect the draw-bars, seat, pole, clamps, pole ring, curricle bar and pole. Tie them together with string and wrap some straw and gunny round the smaller articles to prevent their being lost.

Carts despatched by goods train.

When carts are sent in railway charge, the following additions are suitable :—

Each wheel should have a piece of gunny sewn over two of the spokes. The address can be marked on this without disfiguring the wheel with paint. The fourth package should consist only of the pole, draw-bars, seat and curricle bar.

The grease tins and spanners should be detached from the cart and packed in boxes together with the pole clamps and pole rings, one box to be placed in each truck and to contain the grease tins, etc., of the carts packed in the truck.

Transport of carts by sea.

For transport of carts by sea, they might be similarly packed.

To load Army Transport Carts in Railway Trucks (broad-gauge), procure, if possible, open waggons called "half-waggons" by the Railway authorities. Place one cart body on end in the corner of the waggon with the axle tree bed outwards and resting on the side of the waggon, taking care that the grease tin is uppermost. The next cart body to be placed against the first with the axle tree bed towards the centre of the waggon, care being taken that the grease tin is on the lower side of the axle tree bed.

The third cart to be loaded like No. 2.

Other carts can then be loaded alternately like Nos. 3 and 4 until the whole width of the truck is filled up. In this way from 8 to 10 bodies of Army Transport carts can be carried at each end of a broad-gauge railway truck, leaving room for the wheels in the centre, while the pole bundles (No. 4 package) can be placed on the top of the wheels with the ends in the interstices between the carts.

Thus from 16 to 20 complete carts can be loaded in one open broad-gauge waggon.

A covered waggon on the broad-gauge will hold from 14 to 18 carts if the above system is followed.

LECTURE XVIII.

Principles of Packing and Loading. Drill for Packing and Loading. Description of various Loads of Military Baggage and Stores. Loading Carts.

NOTE.—To illustrate this lecture, we require the various animals mentioned, with complete saddlery and gear, also chahi and sundkha saddles for mules and ponies.

We also want—

2 European Privates' double pole tents.
2 Staff Sergeants' tents.
2 Lascars' Pal tents.
2 Mountain service double fly tents.
2 „ „ single „
1 General service tent, 160 lbs.
2 General service tents, 80 lbs.
4 General service tents, 40 lbs.

Kit bags. For practice, canvas or taut bags can be made of the required shape and filled with old jhools and blocks of wood to resemble the various articles of a soldier's kit. The kit bags should be of the correct weight for European and Native soldiers respectively.

2 pairs of entrenching tool kajawahs.

10 picks
10 shovels } Ordinary.

18 shovels
18 picks
8 billhooks } Light entrenching tools for field service.
1 crowbar
1 hammer

1 pair arm racks.

5 empty ammunition boxes, Martini-Henry.
5 „ „ „ Snider. } Filled with old iron to complete the required weight.

Cooking utensils.

2 sets of boiler pattern.
4 sets of Flanders' kettles.

Bags—

10 40-lb. bags.
5 80-lb. bags.
9 160-lb. bags.

These bags can be made of old jhools or taut and filled with wool and old iron to bring them up to the required weight. The bags must be of the correct dimensions as detailed in the lecture.

Boxes one maund each—

4 ghi boxes	26″ × 11″ × 11″
4 tea boxes	27″ × 16″ × 14″
4 biscuit boxes	30″ × 14″ × 14″
4 preserved meat boxes	28½″ × 15⅝″ × 8″

These can be made of old packing cases and filled with old iron, jhools, etc., to make them the proper weight.

With a fair knowledge of the previous lectures, accompanied by practical application and proof of the principles therein laid down, we can now be trusted to utilise transport animals for real work. Before doing so, however, we must master certain rules by the observance of which, and the use of a certain amount of common sense, we shall be able to adjust loads so that our animals can work with ease and comfort, and without danger of becoming disabled from galls or neglect.

Rules for Loading.

General rules for packing and loading.

1. All loads should ride fairly high, and no part of a load should touch the animal or hang below the belly.

2. The lower part of the load should rest on the saddle pad, and nothing should touch the animal in front of, behind, or below the saddle.

3. A load which rubs against the hips or shoulders must soon gall the animal on these parts.

4. A load which hangs below the saddle interferes with the animal's movements and will gall his sides and elbows.

5. Loads should be compact and so arranged that a flat surface about 2′×1′ will rest against the saddle. This allows of the loads lying close against the animal's side, obviates oscillation and secures an evenly distributed pressure over the weight-bearing surface of the saddle, which may approximately be taken as almost the whole length and the two upper thirds of the pad. A load should, so to speak, cling to the saddle; if it stands out from it to any extent, swaying will occur, and this is an evil which we must strive to avoid.

6. A compact load is easily carried; bulky and badly-packed loads cause inconvenience and extra labour to the animals.

7. If a load is placed too high, it sways from front to rear as the animal moves. Loose girths allow the saddle and load to sway from side to side. A swaying load helps to produce galls.

8. It is of the greatest importance that the loads on each side of the saddle should be of equal weight and also of similar shape. It is better to add stones or bricks to the lighter load than to leave them uneven.

If the nose bag containing the pegs, brush and curry-comb is left out until the load has been packed, it will generally be found useful for purposes of adjustment.

9. The weights laid down for the various animals to carry in addition to their saddlery and gear are the utmost that they can be expected to carry under service conditions without undue detriment to their utility. Over-loading must therefore be prevented on all occasions.

Authorized pack loads.

10. The authorized loads exclusive of gear are here repeated for ready reference.

Elephant	12 to 15 maunds.
Camel	5 „
Mule or pony	2 „
Pack bullock	2 „
Donkey, 1st class	2 „
Donkey, 2nd class	120 lbs.
A Cooli	40 „
An A. T. Cart drawn by 2 mules or ponies	8 maunds.
„ „ „ 2 bullocks ...	10 „

Loading ropes.

11. **Never load an animal until you have ascertained that the saddlery, girths and line gear are properly fitted and adjusted.**

Loading Ropes.

12. With the ordnance saddle the loading ropes are simple and can be easily adjusted. At one end is a loop covered with leather and about a foot from the loop is a ring which passes over the saddle hook. The free end of each rope is bound with leather to prevent its fraying.

Loading ropes.

13. When securing a load in the ordnance loading rope, we must take into consideration the size of the load and adjust the ring accordingly on its flat side.

Adjustment of ropes.

For instance, with a small load like an ammunition box the rings would be at the upper edge, but in a comparatively bulky load like kit-bags the rings should be about one-third of the way down on the flat side.

14. When securing the rope on the load, the free end of each rope should be drawn through the leather-covered loop and pulled tight. It is then convenient to make a loop knot, the loop being secured by a half hitch.

15. Remember, when securing loads, that the loading ropes are liable to stretch especially when wet ropes are exposed to the sun on the march. They should therefore be drawn as tight as possible.

Ropes, however, frequently slacken notwithstanding their having been originally drawn tight, and consequently with the ordnance saddle the upper portion of the load often bears outwards from the animal's back instead of lying close against the saddle.

To prevent this, always cross the spare ends of the ordnance loading ropes from one load to another over the saddle and secure them with a loop knot and half hitch after having got a fair strain above the back.

Adjustment of single loading rope.

Elephants, camels and bullocks are provided with a single loading rope, also mules, ponies and donkeys when equipped with súndkha or cháhi saddles.

The lengths of the single loading ropes allowed for the different animals are—

	Length.	Diameter.
Elephant...	66 feet	$\frac{7}{8}$ inch
Camel	60 „	$\frac{7}{8}$ „
Mule, pony or bullock	50 „	$\frac{5}{8}$ „
Donkey (when supplied with a loading rope) ...	40 „	$\frac{5}{8}$ „

The following is a useful method of packing with the single loading rope. Double the rope and make two loop knots near the bend, regulating the interval between the loops according to the size of the animal and the load to be carried; thus with an elephant the distance between the loops will be about three feet, with a camel about two feet, with a mule or pony eighteen inches, and with a donkey fifteen inches.

Next lay the double rope flat on the ground and place one load on it close to the loops ; place the second load on the ropes at a suitable distance ; take up the ends of the rope, pass them over the second load and under the space between the loads, each rope on its own side, pull the ends over the first load, pass them through the original loops and secure with hitches.

The load can now be placed on the animal's back by two men and adjusted by lengthening or shortening the ropes.

When using the single loading rope with mules, bullocks and donkeys, the spare end of the rope should be carried under the belly and secured to the opposite load.

This gives additional security. It is in fact an open question as to whether a surcingle should not be passed over all loads. It is always used in Persia and Afghanistan, and when properly fixed, prevents oscillation to a great extent.

Necessity for surcingle over loads.

When loading camels with a single loading rope, it is more convenient to place the doubled rope over the saddle after the loop knots have been made in the centre. The loads are then adjusted to their proper position against the saddle and the ropes secured as described for mules and ponies.

It is not always necessary to use the loading rope with camels and donkeys, as loading nets are provided and, if carefully adjusted, allow of the loads lying securely against the sides of the saddle without a loading rope.

Loading nets.

Pack bullocks are also provided with a salita, which is very handy for securing compact loads.

Salitas.

It is not always possible to make up loads of the exact weight laid down for the different animals.

In the event of loads being slightly in excess of the authorized weight, the strongest animals should be selected to carry them.

No animal should be loaded until the fitting of the saddlery has been carefully overhauled. Attention to girthing is most important.

If an animal is shy and frightened, do not stare at him; turn your face away and pull the rein or rope gently, and he will then come up to you.

It is necessary to obtain proficiency in packing and loading the following:—

Tents—

European Privates', double-poled.
Staff Sergeants.
Lascars' Pal.
Mountain Service, double fly.
Do. do. single fly.
General Service Tent, 160 lbs.
Do. do. do. 80 lbs.
Do. do. do. 40 lbs.

Kits—

(*a*) For ordinary marches in India.
(*b*) For field service.

Entrenching tools—

(*a*) Ordinary.
(*b*) Light for field service.

Arm racks.

Ammunition boxes—

(*a*) Snider.
(*b*) Martini-Henry.

LOADS FOR PACK ANIMALS.

Cooking pots—

(*a*) Boiler pattern.

(*b*) Flanders' kettles.

Commissariat Supplies—

40-lb. bags on camels, mules, pack bullocks and donkeys.

1-maund bags on do. do. do.

2-maund bags on camels.

1-*maund boxes*—

Ghi boxes	26″ ×11″ ×11″	On camels, mules, ponies, pack bullocks and donkeys.
Tea do.	27″ ×16″ ×14″	
Preserved meat boxes ...	28½″×15¾″× 8″	
Biscuit boxes	30″ ×14″ ×14″	

Rum kegs on camels, pack mules, ponies and bullocks.

Field ovens on do. do. do.

All stores are as far as possible packed in 80-lb. packages so that they can easily be carried on the animals provided for pack work.

Bags should not be quite full, but a small space about 3 or 4 inches should be left empty, as a full bag bursts when roughly thrown down.

Bags to hold 80 lbs. of such articles as flour, grain and salt should measure approximately 2 feet by 2 feet by 6 inches when filled.

Bags to contain 2 maunds of the above articles should measure about 2 feet by 3 feet by 4 inches when full. The larger-sized bags will be required for such bulky articles as chillies, onions, etc. (Commissariat Field Service Code, para. 286).

For boxes, 3 feet by 20 inches by 1 foot is a suitable size for one maund of stores, these measurements being liable to variation according to the articles which the boxes contain.

In this lecture certain methods will be laid down for packing and loading the various equipments, **but it must be borne in mind that loading pack animals is altogether a matter of common sense and practice.**

Methods of packing laid down are not arbitrary.

If the principles of good loading are not transgressed, it does not matter whether a tent is folded in a particular pattern or a load secured with certain knots. A great deal must be left to individual intelligence, and without this we cannot hope to succeed.

Packing and loading drill.

We must next consider to what extent drill can be introduced into packing and loading work.

It is, of course, desirable that method and uniformity should be observed as far as possible, but it is of no use to lay down a theoretical drill which cannot be conformed to under service conditions.

Various procedures have been recommended in which companies are supposed to observe certain formations and load their kits and tents with clock-work precision. These elaborate systems may possibly pass muster on the parade ground where a number of trained men practise packing and loading at the General's Annual Inspection, but they will not stand the test of a dark morning on the march in India or on field service.

For instance, take a company of 100 men on service.

After allowing for sick, guards, pickets, bâtmen, fatigue parties for packing hospital tents and equipment, Officers' Mess, guard tents, Quarter Master's Stores, regimental entrenching tools and ammunition, not more than 60 men will be left to pack and load the company's kits and tents.

It therefore becomes a matter of company arrangement as to how the work is to be finished in the prescribed time, and for all practical purposes it will be sufficient to say that it takes 10 men to load an elephant, 6 for a camel, and 4 for a mule, pony, bullock or donkey. Their duties will be as described below.

The simplest loading drill is that propounded by Major G. H. Elliot, 3rd B. C., in his instructions for the use of loading frames.

He recommends that 4 men under a Non-Commissioned Officer or Senior Private should be taken as a suitable unit for loading mules, bullocks and ponies.

Loading a company's baggage.

For loading a company's baggage, etc., the following system might be observed.

On the rouse being sounded, the men should pack their kits and place them clear of the tents in groups, the number of kits of which each group should consist being determined with reference to the transport used. The men should then draw the pegs of the tents and roll up the tent ropes, the guy and corner ropes and pegs being left standing.

All available men should then be told off into squads according to the description of animals available, and Non-Commissioned Officers distributed to superintend the squads.

On the G being sounded to strike tents, they should be lowered and packed as laid down for the class of animal used.

The kit-bags, cooking pots, etc., should next be securely packed ready for loading.

On the G being sounded to load, the company baggage, etc., is loaded and the animals moved off in charge of the company baggage guard to the place fixed for parading the Regimental Transport.

It may be here noted that loaded animals should always be moved about, as they tire quickly when kept standing under their loads.

Distribution of work in a loading squad.

The following is the method for distributing the work amongst a squad of four men when loading mules, ponies or bullocks:—

The squad falls in two-deep.

The front rank numbers off from the right 1 and 2, the rear rank from the right 3 and 4.

The odd numbers 1 and 3 work on the off side of the animal—No. 1 at the animal's shoulder, No. 3 at his flank.

Similarly the even numbers 2 and 4 work on the near side—No. 2 at the shoulder and No. 4 at the flank.

This simple system fixes responsibility for bad loading, prevents men from getting in each other's way and reduces to order what would otherwise be a matter of choice or chance.

Loading Drill.

Squads for loading camels.

For camels, where six men are required, three men should be told off to work on each side—Nos. 1, 2 and 3 on the off side, Nos. 4, 5 and 6 on the near side.

Their places and work can be sub-divided as follows when the camel-load is divided into two separate parts :—

Nos. 1 and 3 prepare the off load and bring it up.

Nos. 4 and 6 prepare the near load and bring it up.

Nos. 2 and 5 lay out the loading rope—No. 2 on the off side, No. 5 on the near side. They also turn the ropes up after the loads have been placed against the saddle and pass the loose ends through the opposite loops and secure them.

When using a loading net with camels, three men are required on each side to lift the net containing the load over the saddle.

When European Privates' and Staff Sergeants' tents are loaded on camels, they are folded in long strips and passed over the saddle.

In this case all six men are required to perform the folding and loading of the tent.

When loading elephants, the mahout and cooly lay out the loading ropes on the animal's back and the various loads are handed up to them by the men. Tents must be previously folded as subsequently described.

Squads for loading elephants.

In a regiment on the march the distribution of the different squads should be a matter for company arrangement, varying according to the number of men available and the description of animals supplied.

The general instructions above detailed need not necessarily be implicitly followed. It will be sufficient if the principles are acted up to, and latitude should, of course, be allowed for individual common sense and intelligence.

For purposes of instruction it is, however, necessary to have a detailed system, and it is usual to form up the four animals to be loaded, in the form of a square with the instructor standing in the centre ; the side of the square to be about 20 yards long, the members of each squad standing to their animals and facing inwards—Nos. 1 and 3 on the off side, Nos. 2 and 4 on the near side, the Non-Commissioned Officer of each squad standing five paces in rear of the animal to be loaded, the load lying in front of him and behind the animal.

System of instruction in loading.

In this way the loading of different animals can be simultaneously carried out.

The square might consist of four pack mules with different loads, or four pack bullocks, camels, ponies or donkeys, or might be made up of different animals to be loaded with the same or different loads.

On the words "*commence packing*," the squad lay out the loading ropes and pack the loads.

On the words "*prepare to load*," the loads are brought up on each side of the animal.

On the word "*load*," the loads are raised and secured, the Non-Commissioned Officer standing behind and giving instructions for the proper balancing of the load.

After loading an animal, he should be moved about, and any fault in the packing or loading which may become apparent should be at once rectified. In unloading an animal, both sides of the load must be removed simultaneously.

Loading on súndkha and cháhi saddles.

When loading on flat-topped saddles of native pattern, it must be taken into consideration that there is nothing to prevent the load slipping backwards or forwards when ascending or descending steep hills.

Proposals are now under consideration for making the necessary additions to the cháhi saddle, but the difficulty can to some extent be surmounted by using the spare ends of the loading rope as a surcingle and also attaching them to the dees of the breeching and breast piece.

Variations in weight of tents of similar pattern.

The weights of tent loads quoted in this lecture are only approximate, and an average has been struck after careful weighing and comparison with ordnance specifications.

The weight of tents manufactured under the same specifications appears to be subject to a variation of nearly 15 per cent. according to manufacture and climate.

In a damp climate the tents absorb moisture and weigh heavier than in a dry one.

Bamboo poles, which are outwardly similar, also vary greatly in weight, some being more hollow than others.

As a rule the large tents weigh less than is laid down by the Ordnance Department. This may be accounted for by the fact that the wooden pegs of the large tents are originally 2 feet long, but when sharpened regimentally, their weight becomes considerably reduced.

The weights quoted will be found in some cases to differ from those detailed in other works on the subject, but every precaution has been taken to obtain a fair average.*

Loads for elephants.

Elephants are mostly used for carrying European Privates' and Staff Sergeants' tents. Other descriptions of baggage and equipment can also be easily packed on them ; in fact the elephant is quite the easiest animal to load, as he has two attendants and they have time to devote their attention to the proper adjustment of the loads.

European Privates' tents on elephants.

Three European Privates' tents form the load of two elephants.

For the first load, fold the double flies of two tents in two strips 10 feet long by 2 feet wide and lace loosely in their salitas.

Lay them across the pad, one strip in front of the other, and adjust them so that the load will lie evenly.

Secure the 4 mallets in the lacing of the flies, low down on each side.

Two walls, 2 upright poles, 1 ridge pole and 4 small bamboos should then be made into two equal loads, secured in the loading rope and loaded high up on each side.

Next load two peg bags, one behind the other, on the top of the flies.

* These opinions, together with the instructions for packing and loading, are reprinted from a hand-book published by the author in 1888. They have since been transcribed in a work published by Sub-Conductor Staunton in 1892.

The lanterns and buckets of the two tents should be divided between the two elephants and secured to the sides of the loads.

The load of the second elephant consists of the flies of the third tent and one peg bag packed and loaded similarly to those of the first two tents. Ten walls, 4 upright poles, 2 ridge poles, 2 mallets and 20 small bamboos are then divided into two loads and packed on each side of the elephant.

The poles must be kept high up.

The above system will give a load of about 1,100 lbs. to each elephant, but the weights of these tents are liable to variation as previously described.

Staff Sergeants' tents on elephants.

An elephant carries two complete Staff Sergeants' tents.

The outer and inner flies of each are folded as described for the European Privates' tent and loaded on the elephant—one in front of the other.

Next divide the poles, chicks, etc., of the two tents into two loads, secure in the loading rope and load high up.

Now place the two peg bags across the load one behind the other.

Various loads and stores on elephants.

This load will, as a rule, weigh about 850 lbs., and the elephant will be available to carry 3 maunds of baggage in addition.

The loading of other descriptions of tents, military baggage and stores on elephants is, as a rule, very simple. The loads are handed up and stowed and secured on the elephant's back by the mahout and cooly.

Loading camels.

The loading of camels requires careful attention. They are easily galled if their loads are uneven or sway to any extent.

Tents, bags and boxes are their principal loads.

European Privates' and Staff Sergeants' tents are folded in strips 8 feet long and 1½ feet wide and balanced over the saddle.

Other loads are secured with loading ropes or in the loading net.

European Privates' tents on camels.

A European Privates' tent requires 2 camels.

First load.—Divide the two upright poles, the ridge pole and 8 small bamboos into two equal loads.

Secure them in the loading ropes and load them on a level with the upper bazdáns.

Fold the two flies in a strip 8 feet long and 1½ feet wide and pass them over the saddle, taking care that the load is well balanced. Pass the two mallets through the lacing of the tent—one on each side.

Hang the two buckets and lanterns on each side of the camel, taking care that they do not touch him as he walks.

The spare ends of the loading ropes should be passed over the tent where it crosses the saddle, and should then be drawn tight and secured to the bazdáns.

The weight of this load will be about 400 lbs.

Second load.—Divide the walls into two loads; secure in the loading rope and load them on a level with the upper bazdáns. Lay the peg bags over the saddle, taking care that they are equally balanced and secure them with the spare ends of the loading rope. Weight of load, about 380 lbs.

Staff Sergeants' tents on camels.

One camel carries a Staff Sergeant's tent.

Divide the tent-pole and 8 small bamboos into two loads, secure with the loading rope and load level with the upper bazdán.

Fold the outer and inner fly in a strip 8 feet long by 1½ feet broad, lace loosely in the salíta and pass the load over the saddle, taking care that it is properly balanced ; place the double peg bag over the load, pass the spare ends of the loading rope over the bags ; draw the ropes tight and secure them to the bazdáns.

Hang the lantern and bucket on the outer sides of the flies.

The weight of this load is about 420 lbs., and, as it is slightly in excess of the authorized load, strong camels should be selected for carrying Staff Sergeants' tents.

Lascar pal tents on camels.

Two camels carry 3 lascar pal tents.

First load.—Two tents, two salítas, two peg bags (each with 60 pegs) loaded similarly to the Staff Sergeants' flies and peg-bags.

Weight of this load, about 420 lbs., and a strong camel is required.

Second load.—One tent and salíta, one peg bag and the poles of three tents.

Disjoint the poles and divide them into two equal loads.

Secure them in the loading rope and load level with the upper bazdáns.

Fold the fly in a strip 8 feet by 1½ feet and, laying it over the saddle, place the peg bag over the fly and secure with spare ends of loading ropes as described for the Staff Sergeant's tent.

Weight of this load, about 360 lbs.

Boxes, bags, etc., on camels.

Boxes, bags, small tents, etc., can be loaded with the single loading rope prepared as previously described.

For bags and bulky packages the method of laying out the rope described and illustrated by Hayter and Kelly in Chapter I, Fig. 6, is excellent and should certainly be learnt.

This system cannot be effectually described without illustration and has therefore not been mentioned, illustrations having been avoided as far as possible in this work with a view to keeping down the cost.

Loading nets for camels.

The use of loading nets with camels requires some practice. The difficulty consists in arranging the contents of the net so that the load will be even and at the same time present a flat surface to the sides of the saddle.

The nets can be suitably used for kit bags, cooking pots, small packages and odds and ends of baggage, care being taken that the authorized weight is not exceeded.

We now come to the various loads suitable for mules, ponies, bullocks and donkeys.

To begin with tents.

Lascar pal tents on mules.

It requires three mules to carry two tents.

First load.—Lay the tent out flat, fold in the doors and throw in all the ropes, except one at each end ; fold double at the ridge, then turn in a fold 2½ feet from the top and bottom, fold over again and roll up from either end

equally until the rolls are 2 feet apart, then secure the rolls with the tent ropes, place the tent in the salíta and lace slackly.

Undo the loading ropes and hook them on the saddle, place the tent on the mule and secure with the loading ropes.

When the tent is properly balanced, divide the disjointed poles of one tent into two equal loads and secure them on each side above the tent, with the spare ends of the loading ropes. If preferred, the poles can be equally divided and packed in the middle of the rolls of the tent. Weight, about 170 lbs.

Second load.—Same as No. 1.

Third load.—Two peg bags and two mallets (60 pegs and 1 mallet to each tent). Weight, about 160 lbs.

Equalize the distribution of pegs in each bag. Roll each bag into a compact load, so that the pegs cannot fall out ; secure with loading ropes and place one bag on each side of the mule, secure the mallets above the bags with the spare ends of the loading ropes.

This tent can be similarly carried on súndkha or cháhi saddles by mules, ponies and large donkeys using the long loading rope as previously described for these animals. With bullocks the loading can be carried out on similar lines, and the salíta provided with those animals and laced at the corners is a suitable support for the loads.

Lascar pal tent on súndkha or cháhi saddles.

Mountain service double fly tents on mules.

Three mules to four tents.

First load.—Flies and pegs of two tents : lay the inner fly on the outer fly on the ground and double both across at the ridge ; throw in all the ropes except one ; fold over two feet from the top and bottom ; fold over again and roll up, placing one peg bag inside the roll ; secure the roll with the loose rope and lace it inside the salíta ; secure the tent in the loading rope. Half the mule's load is now ready. Another tent and peg bag packed similarly will complete the first load. Weight, about 165 lbs.

Second load.—Same as No. 1.

Third load.—Place the poles in the pole bags and secure two pole bags with a loading rope for each side of the mule ; weight 90 lbs.

This mule can also carry 70 lbs. of baggage, or two Europeans' or three Natives' field service kits.

Mountain service single fly tents on mules.

Three mules to four tents.

First load.—Two tents and pegs of two tents. Weight, about 160 lbs.

Second load.—The same. Weight, about 160 lbs.

Third load.—Poles of four tents. Weight, 90 lbs.

These loads are all packed similarly to the mountain service double-fly tents. The third mule is also available for 70 lbs. of baggage.

Mountain service double and single fly tents on súndkha and cháhi saddles.

The mountain service double and single fly tents can be similarly packed on mules and ponies equipped with súndkha or cháhi saddles, the long loading rope being used.

With pack bullocks the salíta can be suitably utilised.

General Service Tents.

General service tent (160 lbs.) on mules.

General service tent, 160 *lbs.*

One mule carries one tent.

Lay the fly on the ground doubled at the ridge.

Throw the triangular curtain in on the fly. Roll up and throw in all foot ropes, keeping out the two guy ropes.

Fold over from the top and bottom edges a lap 18 inches wide. Fold over twice again.

The tent will now be folded in a strip 13½ feet long and 18 inches wide.

Roll up tightly and equally from each end, leaving a space of 2 feet in the centre. Secure the rolls with the guy ropes.

Place the tent in the salíta, pressing the rolls as far apart as possible into the corners.

Undo the loading ropes and hook them on to the saddle.

Divide the pegs and the disjointed poles equally in the two sides of the double pole bag, taking care that the pegs do not slip down to the ends of the pole bag, or they may gall the mule.

Place the tent over the saddle and pull the ends down.

Place the double pole bag over the tent.

Cross the loading ropes on each side under the tent and pass them over the pole bags from above, drawing each pole bag downwards and outwards.

Next give each rope two turns round the pole bag and secure the ends in the loops of the loading ropes.

All the above roping must be done tightly and securely, and both bags of the double pole bag must be secured at the same time.

This tent is difficult to load owing to the shortness of the salíta, which causes the load to rest too high on the saddle.

It is under consideration to make the salíta one foot longer than the present pattern, which is 50 inches in length.

If this course is decided on, the above rules for loading the tent can be made applicable to mules and ponies equipped with súndkha or cháhi saddles and also to pack bullocks.

General service tents (80 lbs.) on mules.

General service tents (80 *lbs.*) *on mules.*

Two tents to a mule.

Lay the fly on the ground folded double at the ridge ; throw the triangular curtains in on the fly ; roll in all the ropes and place them on the fly. Turn over from one side about 3 feet.

Turn over from the other side the remaining 2 feet, roll the tent from bottom to top, place the peg bag with mallet in the last roll at the thinner side of the roll ; pack the roll in the salíta, turn in the flaps and lace salíta securely, disjoint the poles and place them in the pole-bag. Place the pole-bag on top of the salíta and secure with loading ropes ready for loading ; this will form one side or half of a mule load.

This tent can also be similarly loaded on mules and ponies equipped with súndkha or cháhi saddles or on pack bullocks.

General service tents, 40 lbs.

These tents are very easy to load if issued according to the Ordnance specifications of Army tents, 1891.

Each tent fits into a cylindrical salíta 2 feet 6 inches long by 1 foot in diameter. The pegs (20) are packed with the tents, also the poles, and an opening is provided in the end of the salíta to allow the ends of the poles to project.

Four 40-lb. tents will make a mule-load. Two tents are secured in the baggage ropes to form half a load. Care must be taken that the baggage rope rings are suitably placed and that the tops of the load are secured to each other to prevent their bearing outwards if the ropes slacken.

The 40-lb. tents can also be easily loaded on camels, ponies and bullocks according to the instructions laid down for loading those animals.

Loading kits.

In loading kit-bags on any pack animals, the general rules previously laid down for the preparation of pack loads must be carefully followed. The loads must be equally balanced.

They must ride sufficiently high, and a flat surface must be presented to the sides of the saddle.

When there is an odd kit, place it in the middle on the top of the saddle and secure with the spare end of the loading rope.

The following table gives the scale of baggage allowed for troops.

To avoid fractions of kits, some animals have been shown as carrying rather more than the authorized load and some less.

The strongest animals must be picked for the heavy loads.

	Ordinary marches.	On field service.	No. of men to a mule, pony or bullock.		No. of men to a camel.	
			Ordinary marches.	On field service.	Ordinary marches.	On field service.
	lbs.	lbs.	No.	No.	No.	No.
Horse Artillery ... Mounted ...	36	30	5	5	11	13
Horse Artillery ... Dismounted ...	80	30	2	5	5	13
Field Artillery and British M. Battery. Mounted ...	36	30	5	5	11	13
Field Artillery and British M. Battery. Dismounted ...	58	30	3	5	7	13
Cavalry ... ... Mounted ...	35	30	5	5	12	13
Cavalry ... ... Dismounted ...	80	30	2	5	5	13
Heavy Battery and Garrison Artillery...	66	30	2	5	6	13
British Infantry*	66	30	2	5	6	13
Indian Infantry	‡60 / ‡40	26⅔	† 3 / ‡ 4	6	† 7 / ‡ 0	16
Indian Cavalry	...	47	...	6	...	16
Indian Followers ... Fighting men...	...	26	...	6	...	16
Indian Followers ... Ordinary ...	...	10	...	16	...	40

* British Infantry are allowed 30 lbs. on field service when they carry their own great-coats. When their great-coats are carried on transport animals, 36 lbs. kit is allowed inclusive of the great-coat.

† 60 lbs. allowed to Sepoys of Indian Infantry Regiments not allowed marching batta on ordinary movements.

‡ 40 lbs. allowed to those Corps drawing marching batta. If public carriage is supplied, half marching batta is deducted.

Entrenching Tools.

Entrenching Tools.

Entrenching tools.

(*a*) Ordinary—in general use in Cantonments, are packed in kajáwahs issued by the Ordnance Department. One mule carries 10 picks and 10 shovels, or in each kajáwah 5 picks and 5 shovels adjusted and strapped in the four partitions as follows :—

1st partition	... ...	1 shovel and 2 picks.
2nd „	... ...	1 shovel and 1 pick.
3rd „	... ...	1 shovel and 1 pick.
4th „	... ...	2 shovels and 1 pick.

The heads of picks and shovels are at the top of the kajáwah and the shovels have their convex side outwards.

Weight of load (including kajáwahs), 178 lbs.

These tools can also be packed in ordinary salítas when supplied with the súndkha saddle. On one side 10 pick heads on to one helve, and on the other side ten shovels and nine pick helves.

The salita must be laced and hooked up so that the loads will ride high and their weight will rest on the saddle.

No part of the entrenching tools must touch the mule.

(*b*) Light entrenching tools for field service will be issued to Corps at the following scale on mobilization for field service :—

Tools.	British Cavalry.	Indian Cavalry.	British and Indian Infantry except Pioneers.
Bars, iron crow { 3′ 6″	2	2	2
Bars, iron crow { 5′ 6″			2
Bars, iron crow { 4′ 6″			2
Hammer, sledge, 2 lbs.	...	...	2
Hooks, bill, handled	16	...	40
Axles, hand, 2 lbs., handled	...	16	...
Picks, light, helved, N. P., 2¾ lbs.	32	16	90
Shovels, helved, light, cast steel	32	40	90

The tools in British and Indian Cavalry Regiments will be carried packed in bags of special pattern on four led horses per regiment.

The following is the detailed method of carrying the field service tools for British and Indian Infantry on mules :—

1st, 2nd, 3rd and 4th pairs of kajáwahs.

Half pair.	*Half pair.*
9 shovels.	9 shovels.
9 picks.	9 picks.
8 bill-hooks.	1 crowbar.

5th pair of kajáwahs.

9 shovels.	9 shovels.
9 picks.	9 picks.
4 bill-hooks.	4 bill-hooks.
1 hammer.	1 hammer.

(N.B.—This pair will require leather loops for bill-hooks on both sides.)

Ammunition and Cooking Utensils.

These kajáwahs are issued to all Infantry Regiments as station stores.

In loading entrenching tools, care must be taken to place the kajáwah rings on the saddle hooks. The chains should then be crossed between the saddle arches as an additional security in case of the rings breaking. The girths attached to the kajáwahs should be firmly secured under the mule's belly.

Arm racks. Arm racks are required to carry the arms of sick men.

No definite pattern has yet been adopted, but several are under trial. They are loaded on the same principle as the entrenching tool kajáwah. 12 Martini-Henry or Snider rifles constitute a mule-load. Weight about, 125 lbs. without racks.

Ammunition boxes. *Martini-Henry Rifle.*—600 rounds in a box ; net weight, 82 lbs.

Martini-Henry Carbine.—630 rounds in a box ; net weight, 79 lbs.

Snider.—560 rounds in a box ; net weight, 72 lbs.

Two boxes form a mule load.

Lay the loading ropes on the ground. Place the ammunition boxes on them the broad end of the slide turned outwards.

Adjust the ropes so that the rings lie on the upper inside edge of the box ; turn the ropes twice round the box clear of the slide, secure the ends of the ropes in the loops and hook the boxes on to the saddle.

Blank ammunition. *Martini-Henry Rifle.*—960 rounds in a box ; net weight, 47 lbs.

Snider.—Net weight, about 50 lbs.

To be loaded similarly to the ball ammunition boxes.

Cooking pots. Two descriptions of cooking pots are used with British troops in India—the boiler pattern and Flanders' kettles.

Boiler pattern. The boiler pattern is difficult to load on pack animals, and pots of this description are generally carried in carts.

Flanders' kettles. Flanders' kettles are generally used on field service and on the march.

Each set of Flanders' kettles consists of 3 kettles, 3 choppers, 3 grid-irons, 3 handles and 3 ladles, and weighs 42 lbs. One of these sets is allowed to every 24 men.

Two sets form half a mule-load and are packed in a salíta fitted with straps and rings to fit on to the ordnance saddle.

These salítas can also be carried on camels, ponies and pack bullocks.

Care must be taken that the cooks do not put grinding stones and other odds and ends in the kettles, or the authorized weight will be exceeded, and it is most important that cooking pots should be well up when the new camp is reached.

" To load Flanders' kettles on mules when salítas are not available :

" Pack in each kettle one chopper, one cover handle, one grid-iron and one " ladle. Place six kettles one within the other as far as they will go, keeping " all the handles on the same side and placing some straw inside each kettle to

" prevent the contents rattling. Place the cover on the topmost kettle and fit " the five remaining covers into each other and place them on top.

" Lay out the loading ropes. Place the load on the ropes handles uppermost. " Adjust the loading rope rings so that the load will not ride too high on the " saddle, secure the loading ropes with a loop knot and half hitch, pass the spare " ends of the ropes tightly round the ends of the loads to prevent the kettles and " covers coming apart, and secure them with knots on the same side as the handles.

" One half of a mule load is now ready.

" Tie up two more sets of kettles in a similar manner and load on the mule- " covers towards the front. Cross the spare ends of the ropes from load to load " over the saddle, and draw them sufficiently tight to prevent the loads bearing " down too much towards the lower edge of the saddle."

Loading carts.

In loading mule or bullock carts, care must be taken that the cart is properly balanced, and that there is no undue upward or downward strain on the animals' backs or necks. A loading rope 60 feet long and 1 inch in diameter is provided with each cart, and the loads should be so secured that they will not shift backwards or forwards when the cart is going up or down hill.

Loading frames.

A few years ago Major Elliot, 3rd Bengal Cavalry, invented a loading frame fashioned on the principle of the kajáwah, which was intended to facilitate the loading and unloading of compact baggage-like kits, bags and boxes on pack animals.

The principle is very sound, but the frames have not as yet met with much success principally owing to want of a proper system in instructing the troops in their use. Various patterns have been tried, and it is to be hoped that a satisfactory one will eventually be evolved, as it will certainly simplify the labour of loading and should also save the animals.

APPENDIX TO LECTURE XVIII.

Table showing the Sub-divisions, Weights, etc., of Camp Equipage and other Loads for Transport Animals.

European Privates' tents on elephants.

European Privates' tents; average weight, 800 lbs. Two elephants to 3 tents.

First load.	*Second load.*
Flies of 2 tents, 4 mallets, 2 walls, 2 upright poles, 1 ridge pole, 4 small bamboos, 2 peg bags, 4 lanterns, 4 buckets ; weight, about 1,100 lbs.	Flies of third tent, 1 peg bag, 10 walls, 4 upright poles, 2 ridge poles, 2 mallets, 20 small bamboos, 2 lanterns, 2 buckets ; weight, about 1,100 lbs.

European Privates' tents on camels.

Two camels to a tent.

First load.	*Second load.*
2 flies, 2 upright poles, 1 ridge pole, 8 small bamboos, 2 buckets, 2 lanterns, 2 mallets ; weight, about 400 lbs.	Walls and bags ; weight, about 380 lbs.

Appendix.

Appendix.

Staff Sergeant's tents on elephants.

Staff Sergeant's tents ; average weight, 420 lbs.

One elephant to two complete tents ; weight, about 850 lbs.

The elephant can also carry three maunds of other baggage.

Staff Sergeants' tents on camels.

One camel to a tent ; weight, about 420 lbs.

Lascar pal tents on mules, ponies or bullocks.

Lascar pal tents ; average weight, 260 lbs. Three mules, ponies or bullocks to two tents.

First load.	*Second load.*	*Third load.*
Fly, salítas and poles of one tent ; weight, about 170 lbs.	Same as No. 1 ; weight, about 170 lbs.	Pegs and bags of 2 tents ; weight, about 170 lbs.

Lascar pal tents on camels.

Two camels to three tents.

First load.	*Second load.*
2 flies, 2 salítas and 2 peg bags ; weight, about 420 lbs.	1 fly, 1 salíta, 1 peg bag and poles of 3 tents. Weight, about 342 lbs.

Mountain service double-fly tents.

Mountain service double-fly tents ; average weight, 105 lbs. 3 mules, ponies or bullocks to four tents.

First load.	*Second load.*	*Third load.*
Flies and pegs of 2 tents ; weight about 170 lbs.	Same as No. 1 ; weight, about 170 lbs.	Poles of 4 tents ; weight, 90 lbs. (the third mule can also carry 70 lbs. baggage or 2 European field service kits).

Mountain service single-fly tents.

Mountain service single-fly tents ; average weight, 96 lbs. 3 mules, ponies or bullocks to four tents.

First load.	*Second load.*	*Third load.*
Flies and pegs of 2 tents ; weight, about 160 lbs.	Same as No. 1.	Poles of 4 tents ; weight, 90 lbs. (the 3rd mule can also carry 70 lbs. baggage).

Regimental general service tents, 160 lbs.

Regimental general service tents, 160 lbs. One mule, pony or bullock to one tent.

Regimental general service tents, 80 lbs.

Regimental general service tent, 80 lbs. One mule, pony or bullock to two tents.

Regimental general service tents, 40 lbs.

Regimental general service tents, 40 lbs. One mule, pony or bullock to 4 tents.

Ordinary entrenching tools.

Ordinary entrenching tools.—

One mule, pony or bullock.	*One camel.*
10 picks, 10 shovels } Weight, about 178 lbs. with kajáwahs.	20 picks, 20 shovels } Weight, about 356 lbs. with kajáwahs.

Light entrenching tools for field service.

Light entrenching tools.—To be carried as described in Lecture XVIII.

Appendix.

Arm racks.

Arm racks.—1 mule, pony and bullock, 12 Martini-Henry or Snider rifles ; weight, 177 lbs.

Ammunition.

Ammunition.—

One mule, pony or bullock.	*One camel.*
2 boxes Martini-Henry .....156 lbs.	5 boxes, 390 lbs.
2 boxes Snider.....158 lbs.	

Cooking pots.

Cooking pots, Boiler pattern.—1 mule, pony or bullock, two sets ; weight, 150 lbs.

Flanders' kettles.—1 mule, pony or bullock to 4 sets ; weight, about 160 lbs.

LECTURE XIX.

Transport Artificers—their Tools and Materials for Work. Workshop Records and Supervision. Expenditure for Repairs.

NOTE.—For illustration of this lecture we require the working tools and tool boxes as described for the different artificers, also good and inferior samples of the following :—

Iron, cast.
Iron, wrought, British.
" " Swedish.
Coal, English.
Charcoal.
Cinders.
Wood, babúl.
" pedook.
" aini.
" teak.
" blackwood.
Chat.
Tat, Bengal and Sholapore.
Leather, buffalo, heavy.
" " light.
" cow.
Thread, flax sewing.
" whited brown.
" cotton.
Twine, Indian.
Wool.
Serge.
Coir.
Numdah.
Newar.
Wax, yellow.
" cobbler's.
Buckles, Ds, hooks and rings as used for saddlery.

Field Service Code.—Contingent Bill (Form No. 33 and Commissariat Form No. 65.)

Artificers are allowed for Transport establishments on the following scale—

	Pack mules or ponies. 500	Donkeys. 500	Pack bullocks. 500	Camels. 500	A. T. carts with bullocks or mules. 250 carts with 500 mules or bullocks.
Blacksmiths	2	...	...	...	2
Hammermen	2	...	...	...	2
Bellowsmen	2	...	...	...	2
Carpenters	1	...	...	...	3
Saddlers	6	5	6	...	10 (only with mules or ponies).
Shoeing-smiths	1 (*a*)	...	...	...	4
Camel saddle-makers	...	...	...	...	...

(*a*) For ponies an extra shoeing-smith per 500 animals is allowed.

The rates of pay for the above artificers are shown in Lecture XIII.

It will be seen that the pay of these artificers is much higher in Bombay than in Bengal and Madras.

While avoiding comparisons as to the relative merits of the artisans of the three Presidencies, it may be safely said that a good workman is almost always an economical servant, while an inferior artificer is a constant source of waste, trouble and annoyance. The one, from his superior knowledge and intelligence, knows how to apply his materials and time as economically as possible ;

he can keep his tools in proper order and mend them if necessary, and his work is lasting and saves the outlay involved by frequent repairs.

On the other hand the cheap and inferior workman is an expensive luxury. He wastes coal, wood, iron, leather, serge, etc., and also his own time and that of his supervisors. He spoils his tools, and owing to his mistakes, his work often has to be repeated with an additional expenditure of labour and materials.

He is, in short, an extravagance which would be rigidly excluded from any concern or factory worked on business principles.

A homely illustration of the above argument is afforded us in the difference between good and inferior specimens of the verandah darzi. The former makes the most of his time and materials, while the latter wastes both.

The subject of artificers and their various duties is a large one if fully gone into and would be beyond the scope of this chapter, which will only deal with the normal daily work of repairing carts and different articles of saddlery and line-gear.

Blacksmiths.

Transport blacksmiths are employed in repairing the iron work of saddlery and line-gear and making and fitting bolts, clamps and nuts for carts.

Each blacksmith is assisted by a hammerman and a bellowsman.

The hammerman wields the sledge-hammer as directed by the blacksmith; the bellowsman blows the bellows and attends to the fire.

They should also assist in making bolts, screws and nuts with the stocks and dies, and help to finish off and file the iron work after it has been fashioned by the smith.

Artificers' tools.

The scales of tools allowed for artificers on field service are laid down in Appendix 55 of the Commissariat Field Service Code.

A revision of this Appendix may be looked for, as some of the tools allowed are not required, while others which are really necessary have been omitted.

The following tools are recommended as suitable for a transport blacksmith on field service :—

		Weight. lbs.	oz.
Blacksmith's tools.	1 Anvil	28	0
	1 set of Whitworth's stocks and dies $\frac{1}{8}$″ to 1″ ...	46	0
	1 pair of bellows, country, double, of thin cow-hide, 4 feet long, with iron nozzle 12″ long inserted 5″ into the leather	13	0
	Total ...	87	0

(NOTE.—The box containing the stocks and dies measures 3′ × 1′ × 3¾″, and with the anvil and bellows will form half a mule-load. The box can be secured in the loading ropes with the bellows folded over it, and the anvil should be wrapped in gunny and secured over the box with the spare ends of the loading rope.

A suitable kajáwah to carry the box, anvil and bellows could be easily devised.

Blacksmith's Tools.

The remaining blacksmith's tools are—

		Weight. lbs.	oz.
1	Double furnace-nozzle of iron 1′ long for inserting iron nozzles of bellows	2	0
1	Chisel, hand, cold, 8″ × ¾″	0	11
1	Chisel, smith's, rod, cold 5¼″ × 1⅛″	1	3
1	„ „ hot, 5½″ × ⅝″	1	0
1	Pair compasses, wing, 10″	0	9
1	Screw driver 6″ with 5″ handle	0	4½
2	Files, bastard, flat, taper, 10″	2	0
1	File, „ half-round, 10″	0	10
2	Files, „ triangular, 7″	0	10
1	Sledge hammer, smith's, handled, 8 lbs., with 2′ handle	9	0
1	Hand hammer, smith's, handled, 3 lbs., with 1′ 8″ handle	4	0
1	Rivetting hammer, smith's, handled, 1 lb., with 1′ 4″ handle	1	12
1	File-handle, large	0	3
1	„ small	0	2
1	Punch, smith's, cold, 7″ long ⅞″ diameter	0	14
1	„ „ hot, 6″ long ⅞″ diameter at base, ½″ at point	1	1
1	Rule, 2′, iron or steel	0	3
1	Square, iron, figured	1	7
1	Oil stone, smith's, without frame	2	0
1	Pair tongs, smith's, forge, 18″ long, with flat jaws, heavy	1	14
1	Pair tongs, smith's, forge, 14″ long, with flat jaws, light	1	8
1	Pair tongs, smith's, forge, 18″ long, with round jaws	1	14
1	Vice, bench, 10 lbs.	10	0
1	Vice, hand	1	12
1	Spanner (MacMahon's)	3	12
1	Die-plate, 1′ × 2″ × ¼″, with 3 holes ¼″, ⅜″ and 1⅛″ diameter respectively	1	4
1	Tool box, smith's, pannier, of ⅝″ deal plank, 2′ 3¼″ × 1′ 2″ × 1′ 1″, with tray	35	8
	Total	87	1½

The tray to be 3½ inches deep and partitioned to suit the lighter tools.

The heavy tools to be packed in the bottom of the box, which is partitioned longitudinally. The box to be bound with 1½″ iron bands with two hinges and two padlock clasps 1 foot 2½ inches apart; 2 iron D rings fitted under the bands 3″ from the top for attaching the box to the saddle.

The whole covered with canvas.

With the above arrangement, a complete set of blacksmith's tools can be carried on a mule. The load is 14 lbs. over the authorized weight, but a strong mule might be selected.

(Note.—The arrangement for setting up a pair of Indian bellows should be illustrated and the use of the different tools explained.)

Blacksmith's Work.

Care must be taken to keep the bellows carefully greased and thoroughly pliant, so that they will not be liable to crack.

The steel tools require occasional sharpening and tempering.

Materials for blacksmith's work.

The materials for a transport blacksmith's work are iron and fuel. Cast iron is not malleable, but can be fitted and altered by filing.

The wrought iron generally used is either British or Swedish, round and flat. The British iron obtainable in Indian bazaars is, as a rule, of inferior quality, but excellent British "Lowmoor" iron can be obtained at seaports and large towns from the better class of merchants.

Swedish iron is tougher and more malleable than the British iron generally obtainable. Good wrought iron is tough and when cold will stand a certain amount of bending without cracking; when hot, a hole can be punched near the edge without making the iron burst out. Inferior iron will not stand these tests.

Another test is to take a bar of square iron, cut it partly through near the end with a chisel and then break off the end with a hammer. With good iron the fracture will be rather ragged, as some of the fibres will be slightly drawn out. The substance of the fractured surface will, however, be dense and compressed. If the iron is bad, the fracture will be very short and the broken surface will have a spangled and pumiced appearance. This test is a question of comparison and will be better understood by cutting and breaking good and bad iron and noting the different appearance of the broken surfaces.

Fuel for blacksmiths' work.

The descriptions of fuel generally used are English coal, charcoal, and a mixture of English coal and cinders raked from railway engines or factory furnaces. Charcoal is only suitable for very light work.

The consumption of these materials varies according to the work performed. For ordinary repairs a transport blacksmith will use in a day about 20 lbs. of English coal or 50 lbs. of charcoal or 25 lbs. of cinders and coal mixed in the proportion of two-thirds of cinders and one-third of coal. The wages of artificers temporarily employed varies considerably in different districts.

In the Bombay Presidency a very ordinary blacksmith capable of executing general repairs to chains, etc., is paid 12 annas a day.

In Bengal and Madras the daily pay is about a third less.

Carpenter's tools.

Transport carpenters are employed for repairing carts, saddle bars, etc.

The following tools are recommended for a transport carpenter on field service :—

	Weight. lbs.	oz.
1 Adze, handled, carpenter's head, 6″ long 3″ broad at edge, handle 18″ long	4	2
1 Auger screw, ¾″	1	2
1 Auger screw, 1″	1	10
1 Chisel socket, 1″, handled	0	5½
Carried over...	7	3½

Carpenter's Tools—Wood.

	Weight. lbs.	oz.
Brought forward...	7	3½
1 Chisel, mortice, ½″, handled	1	0
1 Pair compasses, wing, 10″	0	9
1 Screw-driver, 6″, with 5″ handle	0	4½
1 File, triangular, 6″ long	0	5
1 File, bastard, half-round, 10″ long	0	9½
1 Rasp ½″ and 10″ long	0	9½
3 Handles for files and rasps	0	8
2 Handles for augers	0	5
1 Chalk line with reel and ¼ lb. of chalk	0	6½
6 Pencils, carpenter's, blacklead	0	2½
1 Pair pincers	0	15
1 Jack plane, 2⅜″ iron	1	13
1 Smoothing plane, 16″, with 2″ iron...	4	3
1 Rule, 2′ common	0	3
1 Hand saw, 26″	1	4½
1 Spoke-shave, 3½″	0	5½
1 Square with steel blade	1	0
1 Oil stone, carpenter's, in frame	1	14
1 Brace with 24 bits	3	7
1 Carpenter's mortice gauge	0	3
1 Carpenter's marking gauge	0	8
1 Rivetting hammer, handled, 16 oz., with handle	1	8
1 Glue pot and brush	3	2
1 Carpenter's tool-box	35	8
Total...	67	13

One set of carpenter's tools with tool-box makes half a mule load.

The tool-box to be similar to that used for a blacksmith. The tray to be fitted to admit of the planes, brace, bits and other light tools being securely packed.

(Note.—The use of these different tools to be explained.)

Materials for carpenter's work.

The various descriptions of wood used for transport work in India are as follows, and their relative weights are shown opposite their names :—

	Weight of a block 1′ × 2″ × 2″. lb.	oz.
Babul, light-coloured	1	10
„ red	1	8
Pedook (Andaman wood)	1	9
Ainí	1	12
Teak (Ságwán)	1	4
Blackwood (Shísham)	1	8

SHOEING-SMITH'S TOOLS.

Pedook and teak are more generally used.

No wood should be used which is not well dried and seasoned, and should not be used for carts, etc., until at least a year after it has been cut.

Indian carpenters have a tendency to waste wood by chopping with the adze when a piece might be sawn off, and this practice will be found to prevail extensively where carpenters are allowed to remove the chips and shavings for their own use.

The careful fitting of wheels, as described in Lecture XVII, is an important part of the carpenter's work.

Shoeing-smith's tools.

A shoeing-smith should be provided with the following tools :—

	Weight. lbs. oz.
1 Farrier's buffer	0 11
1 Hammer, handled, pointing	0 10
1 „ „ shoeing	1 10
3 Knives, farrier's drawing	0 9
1 „ „ searching	0 2½
2 Farrier's rasps, 15"	11 4
1 Farrier's iron stake for pointing	1 2
2 Pairs farrier's pincers	4 0
1 Stone, scythe, rag	2 0
1 Anvil with ring	8 0
1 Farrier's tool-bag	3 10
Total...	33 10½

Two sets of shoeing smith's tools will form half a mule load and will balance the carpenter's tools.

Thus out of 5 0 pack mules the artificers will require for their tools—

2 Blacksmiths	2 mules.
1 Carpenter	½ a mule.
1 Shoeing-smith	¼ of a mule.
	2¾ mules.

and out of 250 Army Transport carts with 500 draught mules, one cart will be required for the tools of the—

2 Blacksmiths.
3 Carpenters.
4 Shoeing-smiths.

Shoeing rules.

The rules for shoeing have been fully detailed in Lecture XIV, and it is most important that they should be acted up to in their entirety.

Native shoeing-smiths will generally do all they can to shirk the conditions laid down, but, if treated with firmness and fined whenever they disobey orders, they can soon be brought to see reason.

Saddler's Tools.

Saddler's Tools.

Feet of unshod animals.

The care of the feet of unshod mules, ponies and bullocks is also an important part of the transport shoeing-smith's duties.

The feet often grow unevenly and require to be reduced with the rasp.

If the bottom of the wall projects too much, it becomes ragged and broken, in which case the broken edges must be rasped smooth to prevent the damage extending.

Saddlers.

The supervision of transport saddlers demands our most careful attention.

It is all-important that saddlery and line-gear should be kept in thorough repair and ready to be despatched on service at any moment.

All repairs should be thorough and promptly executed as required.

A stitch in time is said to save nine, but, unless it is a good stitch, it will not maintain its reputation.

Saddler's tools.

The following are the tools which a transport saddler requires on field service :—

		lbs.	oz.
4	Blades, awl, $1\frac{3}{4}$″ long 4 „ „ $1\frac{5}{8}$″ „ 4 „ „ $1\frac{3}{8}$″ „ 2 „ „ curved, 2″ long 2 „ „ seating	0	$1\frac{1}{2}$
1	Chisel, hand, cold, 8″ × $\frac{3}{4}$″	0	10
1	Pair compasses, common, 7″	0	2
1	Plough gauge with one knife	1	12
1	Screw-driver 6″ with 5″ handle	0	$4\frac{1}{2}$
6	Punches, saddler's, sizes 20 to 25, with block of lead for punching	2	11
1	Saddler's rivetting hammer, 8 oz., handled	0	12
1	File, triangular, 6″	0	$5\frac{1}{2}$
1	Handle awl	0	1
1	„ „ seating	0	1
1	Knife, half-round	0	$4\frac{1}{2}$
1	„ head	0	2
1	Clasp-knife with marlin-spike	0	$9\frac{1}{2}$
25	Pairs harness needles	0	2
12	Quilting needles	0	1
24	Sewing needles	0	1
1	Edging tool	0	2
1	Pair of saddler's pincers	0	14
1	Rule, 2′ common	0	3
1	Pair tailor's scissors, 9″	0	4
1	Stone, scythe, rag	2	0
1	Mallet, boxwood	2	4
1	Pair clams, collar-maker's, 1′ long	2	14
1	Leather bag fitted for saddler's tools	4	0
	Total	20	$9\frac{1}{2}$

Saddlers might easily carry their own tools on the march, but if carriage is provided for this purpose, 4 saddler's tool bags packed together in gunny would form half a mule load.

(NOTE.—The use of the different tools to be explained.)

Materials for saddler's work.

The materials which a saddler requires for repairing the gear of transport animals are—

Leather.	Wool.
Chat.	Serge.
Tát.	Coir.
Thread, flax, sewing.	Numdah.
„ whited brown (English).	Newar.
„ cotton.	Wax, yellow.
Twine, Indian, 1st quality or "Bengal."	„ black, prepared.
„ „ 2nd quality.	Buckles, D's, hooks and rings.

The leather used for transport work is almost all of Indian manufacture. Indian leather is made under two systems :—

(*a*) Bag tanning.

(*b*) Pit tanning.

Bag-tanned leather.

Bag tanning is a very rough method. The edges of the hide are stitched together so as to form a bag, which is hung on a frame and filled with an astringent liquid containing tannin, which acts on the hide and turns it into leather. The tannin in the liquid is generally extracted from babúl bark. The liquid drops through the interstices of the sewing into a trough and the bag is constantly refilled.

When the inside of the hide is considered sufficiently tanned, the bag is inverted and the process repeated. This system of tanning takes from 4 to 6 weeks according to the thickness of the hide. The leather thus made is poor and has an offensive odour.

Pit-tanned leather.

The system of pit tanning has only been lately taken up in India, and is principally due to the enterprise of European firms established in large towns, notably at Bombay and Cawnpore. The hides are laid in pits and subjected to the action of astringents. This process, which often lasts over a year, is too elaborate to be explained here, and it will be sufficient to say that the manufacture is finally completed by thoroughly nourishing the leather with dubbing, which penetrates to its fibres, makes it soft and mellow and increases its tensile strength.

In examining the results of the different systems of manufacture, it will be found that the fibres of bag-tanned leather are coarse and dry and that the outer surface is wrinkled and harsh. As a rule, it is not properly tanned throughout its thickness, and as regards its appearance and durability, it compares very unfavourably with the pit-tanned leather. To examine leather, we should cut a piece through and examine the section. If it is good, the fibres will be densely packed and of uniform colour throughout its thickness. The leather will also be soft and pliant. Any difference in color in the middle of the section points to the fact that the leather has not been thoroughly tanned.

In inferior leather the fibres will be found coarse and hard and not closely packed. The thinnest part of a hide is the belly, and the back is the thickest part.

From the above description, it will be understood that bag-tanned leather should not be used when pit-tanned leather is obtainable. There is a considerable difference in the price, bag-tanned leather costing about 6 annas per lb., and good Indian pit-tanned about 1 rupee per lb.

The different qualities of pit-tanned leather are—

Leather, buffalo, heavy,
" " light,
" cow,
" sheep skin,

and they are selected for use according to requirements.

Flax thread.

The *flax thread* is used for sewing. Four threads are twisted together and used for ordinary work.

English whited brown thread is used for very strong leather work, and is doubled when sewing súndkha and cháhi saddles.

Indian cotton is used for quilting jhools. The cotton used for this purpose is composed of 20 threads tightly twisted.

Indian twine of the quality described as "Bengal" is used for sewing jhools, nose-bags, &c. The second quality is used for sewing grain-bags.

Chat.

Chat is coarse cloth made of goat's hair It is very durable and is used for making jhools, nose-bags, and native pattern saddles. It is made in pieces of various dimensions and is procurable in the Punjab, Scinde, Beloochistan, and the Persian Gulf. Chat is paid for by the square foot, and its price varies according to the texture and quality of the cloth.

Tát.

Tát is a coarse Indian cloth made of hemp fibre, and is used for the same purposes as chat. Chat should, however, be used when procurable. The tát of Madras and Bombay is as a rule superior to Bengal tát. The quality known as "Sholapore tát" manufactured in the Deccan is particularly good. It is streaked with red and black lines. Tát is bought by the yard and varies in width and price.

Wool and serge.

Wool and serge are used for stuffing and lining saddles, and their qualities have been spoken of in Lecture XVI. The serge of Indian manufacture supplied by the Ordnance Department for transport repair is 54" wide.

Numdah.

Numdah is used in the manufacture of cháhi saddles and saddle-cloths, also for making súndkha saddle-cloths. It is made of sheep's wool matted together with size and rolled out to the required thickness. Inferior numdah contains sand and rubbish dishonestly added to increase its weight. Bad size is often used, which melts in damp weather. It must, however, be taken into consideration that Indian numdah is rough compared with that of European manufacture, but it is not fit for use unless free from the above defects.

Saddler's Work.

Coir. Coir is the fibre peeled from the shell of the cocoanut and is used for stuffing bullock saddles and súndkha pads. It should be well cleaned and free from husk and dust.

Newar. Newar is cotton webbing used for fastening jhools and nose-bags and also in the manufacture of the component parts of camel, bullock and donkey saddles.

Wax. Cobblers' wax is made as follows :—

Pitch	} Equal parts.
Resin	
Bees' wax...	

Boil together for 2 hours and stir gently until the mixture can be pulled out into long strings on the end of a stick. This wax is used for all transport leather work.

Saddlers' working stitch. The Indian system of sewing leather is a bad one. The native saddler works with a hooked awl and makes a catch stitch which is insecure and does not keep out moisture, as the hole made is larger than the thread passed through it. The proper method is to make a hole with a fine pointed awl. Double threads are then passed through from opposite ends and pulled tight, some amount of force being required to draw the double thread through the small hole. The ends of the thread may be simply pointed and merged into a strong bristle, or they may be attached to fine needles.

The Indian stitch is unsatisfactory, but is quickly made and is easy to execute and accordingly finds favor with native saddlers. They should, however, be weaned from their custom and taught the proper stitch, which they will do well in a short time. They are sure to give trouble at first, but if carefully watched and fined if they do not comply with the new instructions, they will soon yield to the inevitable. All sewing thread should be well waxed before use, so that the wet will not penetrate and rot it.

Workshops records. The attached form will be found very useful for all transport workshops. A check can thus be kept on the receipt and issue of repairing materials, and the work performed by the different artificers will thus come under daily notice. Attention is invited to the note at the foot of the form.

Statement showing the repairing material used, and work executed by, Blacksmiths / Carpenters / Shoeing-smiths / Saddlers during 189

	Repairing materials.							Work executed.	Initials of Warrant Officer in charge.	Initials of Transport Officer.	
Balance from last month.											
Receipts.											

Total Receipts.										
Issues.										
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
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19										
20										
21										
22										
23										
24										
25										
26										
27										
28										
29										
30										
31										
Total Expenditure.										
Balance										

N. B.—A separate sheet will be kept up for each trade, the necessary items of repairing materials being shown above the columns.
Expenditure and receipts of repairing and cleaning materials will also be shown daily on a similar sheet.

In the case of shoeing-smiths the consecutive numbers of the $\frac{\text{mules}}{\text{ponies}}$ or bullocks shod should be entered thus :—

$\frac{\text{Mules}}{\text{Ponies}}$ shod on forefeet	.....	Nos. 2, 7, 8, etc.	
,, ,, all round	.....	,, 10, 20 ,,	
,, feet rasped	.....	,, 15, 25 ,,	
Bullocks shod	.....	,, 8, 10 ,,	

It is proposed to adopt a special record for shoeing-smith's work, and orders may be shortly expected.

Repairs to jhools and nose-bags.

It is a good plan to accustom the drivers to keep their own jhools and nose bags in repair; and with this view each driver should be provided with a packing needle and twine and should be supplied with repairing materials for his jhools and nose-bags whenever necessary. Other articles of gear requiring repairs should be taken by duffadárs of troops to the workshops every morning after stables.

Supervision of transport workshops.

It is a good system to place a Sergeant in charge of the workshops. He should be under the orders of the Warrant Officer in charge of the lines and should devote special attention to the economy of labor and materials. The "Handbook for Military Artificers," 1886, prepared at Woolwich will be a great assistance to him (price Rs. 2).

Working hours.

Suitable working hours for transport workshops are from 7 to 11 a.m. and 1 to 5 p.m. The Non-Commissioned Officer in charge should check all work done when the shops close at 11 a.m. and 5 p.m.

When artificers proceed on the march in India with Government transport, their field service tools will be sufficient, and a supply of the necessary repairing materials should be sent.

The ends of all ropes should be bound with leather to prevent their fraying.

Expenditure for petty repairs.

Paras. 1831 and 1832, A. R. I., Vol. V, deal with the expenditure incurred in connection with petty repairs. The instructions given are very plain, and should be carefully noted by all Transport Officers (see also Ryland, page 93).

In addition to the monthly expenditure allowed, the Ordnance Department annually supplies the following repairing materials :—

Buckles, iron roller single, $2\frac{1}{2}$"	...	...	No.	1
Do. do. 2"	...	...	,,	2
Do. do. $1\frac{3}{4}$"	...	...	,,	2
Do. do. $1\frac{1}{2}$"	...	...	,,	12
Do. do. $1\frac{1}{4}$"	...	...	,,	4
Serge	...	...	yds.	75
Thread, flax, sewing coarse ...	...	...	lbs.	5
Do. whited brown ...	...	...	,,	5
Twine	...	...	,,	5
Buffalo-hide, tanned and curried, heavy	...		,,	100
Do. do. light	...		,,	50
Cow-hide, tanned and curried ...	...	...	,,	50

per 100 mules per annum.

Repair of carts.

Para. 1906, A. R. I., Vol. V, lays down that in Bombay when carts require heavy repairs, they should be surveyed by the Commissariat Transport Officer in charge and forwarded to the local Arsenal for the execution of repairs.

Heavy repairs.

Para. 1935, A. R. I., Vol. V, provides for the extensive repairs of saddlery and line gear and lays down the necessary procedure. The para. however requires re-construction, as gear is on

these occasions surveyed by Commissariat Transport Officers, and not by a Committee (Government of India Military letter No. 1028-D of 14th April 1887 to Commissary-General-in-Chief, embodied in Bombay Government Resolution No. 1620 of 2nd May 1887).

Indents for repairing materials and petty supplies should be preferred in advance on the 25th of each month on Commissariat Form No. 65 and complied with on the 1st of the month following. Special indents are submitted for articles urgently required.

Nothing has as yet been laid down regarding repairing materials required for field service.

A certain quantity of the different articles should accompany the animals. This should be reduced to the lowest possible limit; but in the event of a campaign extending over six months, it will be necessary to store additional supplies of these materials at base or advanced depôts.

Repairing materials on service.

The following table will give an approximate estimate of the materials required with the animals for three months.

(The materials can easily be packed in 80 lbs. gross loads in cylindrical salítas of tát or chat 30″ long and 1′ in diameter.)

Particulars.	Quantity.	Weight.	Remarks.
For 100 *draught or pack-mules, or* 100 *draught or pack ponies, with ordnance equipment for three months.*		lbs.	
Hide, buffalo, tanned and curried, heavy ...	80 lbs.	80	
Do. do. light ...	20 „	20	
Hide, cow, ordinary	20 „	20	
Wool, sheep, cleaned	80 „	80	
Newar, 2½″ broad...	60 yds.	6	
Thread, flax, sewing coarse ..	6 lbs.	6	
Do. whited brown ...	1 „	1	
Wax, cobbler's black	2 „	2	
Do. bees'	1 „	1	
Needles, packing	3 doz.	½	
Twine, country, ...	9 lbs.	9	
Serge, 54″ broad	20 yds.	24	
Iron Swedish rod, $\frac{5}{16}$″ (Cut into lengths of 2′ 6″)	30 lbs.	30	
Do. flat 1″ × $\frac{3}{8}$″ (Cut into lengths of 2′ 6″)	20 „	20	
Do. square $\frac{5}{16}$″ (Cut into lengths of 2′ 6″)	30 „	30	
Blankets, country	2 No.	8	
Chat or Gunny tát	12 sq.yds	36	Tát will be lighter.
Charcoal	10 lbs.	10	For emergencies; to be replaced as expended.
Hemp, sewing	6 lbs.	6	
Total...	...	390	

Repairing Materials.

(Note.—It is not necessary to take prepared dubbing into the field. Suet obtained from slaughtered animals, melted and strained to remove the impurities, will answer for the purpose of keeping saddlery soft and pliant, but a supply of dubbing should be kept at the base.)

Particulars.	Quantity.	Weight.	Remarks.
For 100 *pack bullocks for three months.*		lbs.	
Hide, buffalo, tanned and curried, medium	10 lbs.	10	
Wax, bees'	3 „	3	
Gunny tát	125 yds.	48	
Packing needles	3 doz.	½	
Twine, country	15 lbs.	15	
Thread, coarse, cotton	4 „	4	
Cloth for lining saddles	50 yds.	25	
Newar 3″ broad	150 „	15	
Rope, cotton, ½″	40 lbs.	40	
Total...	.....	160	
For 100 *Draught Bullocks for three months.*			
Hide, buffalo, tanned and curried, medium	8 lbs.	8	
Wax, cobblers', black	1 lb.	1	
„ bees'	1 „	1	
Gunny tát	30 sq. yds.	30	
Packing needles	5 doz.	2	One to each driver.
Twine, country	5 lbs.	5	
Newar 3″	100 yds.	10	
Rope, hempen, ½″...	15 lbs.	15	
Charcoal	10 „	10	For emergencies; to be replaced as expended.
Total...	.....	82	
For 50 *A. T. Carts for three months.*			
Grease	80 lbs.	80	
Bolts with Nuts. 5″ by ½″ square head ...	2 doz.	12	Bolts and nuts as used with A. T. carts.
Bolts with Nuts. 4½″ by ½″, countersunk-head	2 „	10	Bolts and nuts as used with A. T. carts.
Bolts with Nuts. 4″ by $\frac{7}{26}$″ sqr. head ...	2 „	6	Bolts and nuts as used with A. T. carts.
Iron, Swedish rod ½″ (Cut into lengths of 2′ 6″)	20 lbs.	20	
„ „ square ½″ (Cut into lengths of 2′ 6″)	20 „	20	
Coal tar	12 „	12	
Total...	.....	160	

LECTURE XX.

Supply of Carriage—for Station duties in Cantonments; for the March; for Field Service. Routine and Discipline on the March.

(NOTE.—To illustrate this lecture we require Commissariat-Transport Forms Nos. 14, 15, 25 and 25-A, G. O. No. 46 of 1890, and the Commissariat Field Service Code.)

Employment of transport in peace-time.

We must remember that transport establishments are kept up in peace-time solely with a view to meeting the exigencies of field service, and that for ordinary work in cantonments and for relief marches it would be more economical to employ hired carriage. We must therefore consider the most profitable method of utilising our animals in peace-time, so that the expense of their feed and keep will be, as far as possible, counterbalanced by the value of the work performed by them. It is further necessary that, in order to keep our animals fit so as to successfully encounter the trials of field service, they should have a good share of regular work, accompanied, of course, by good feeding and management. For this reason transport animals are distributed through the various cantonments in India, where they can be profitably worked, and they are also used to carry the baggage and camp equipage of troops when marching in relief from station to station.

Regimental transport.

The troops which would be first required for field service keep their authorized service carriage in their own charge, and these animals have also to be utilised in peace-time.

All Government transport allotted to a district is under the control of the General Officer Commanding the district. Matters of interior economy and general control of expenditure rest with the Commissary-General.

The procedure to be adopted when transport animals are permanently transferred from district to district, or from station to station within a district, is laid down in paras. 2001 and 2002, A. R. I., Vol. V.

Supply of carriage in cantonments.

The supply of carriage within cantonments will be arranged for by the Chief Commissariat Officer at head-quarter stations, and by Commissariat-Transport Officers at out-stations. Both Depôt and Regimental transport are used as required for general work, the Commissariat-Transport Officer detailing transport for the various duties.

When Government carriage is not available, hired carriage is supplied for authorized work.

Orders relating to supply of carriage.

The following orders will, *mutatis mutandis*, be found applicable for Cantonment work. They are taken from the Standing Orders of the Poona Cantonment.

"1. Whenever possible, at least 24 hours' notice should be given of all re-
"quirements for carriage, and requisitions are to be made on the annexed form,
"copies of which can be obtained at the Chief Commissariat Office.

CANTONMENT STANDING ORDERS FOR TRANSPORT WORK.

" 2. The printed instructions on both sides of the requisition form are to " be carefully complied with, and all information, as noted in the headings, is to " be duly filled in. The cover should be marked " Indent for Carriage."

" 3. To avoid delay, indents for authorized carriage for ordinary station " work can be sent direct to the Warrant Officer in charge of the Transport Lines, " but any unauthorized indents should be addressed to the Transport Officer and " sent to the Chief Commissariat Officer for disposal. All requirements for sick " carriage will be indented for by Medical Officers concerned.

"4. When practicable, pack mules should be used; and when carts are indent- " ed for, it should be noted on the requisition that the stores cannot be carried " on pack mules. In the absence of this certificate, pack mules will be supplied " if available.

" 5. 9-30 a.m. is the most convenient hour to supply carriage for conveyance " of stores, &c., so that the mules can be groomed and fed before going to work. " Requisitions for carriage on Saturdays and Sundays should be avoided if pos- " sible. Requisitions for carriage to be supplied on Monday should reach the " Transport Lines or Chief Commissariat Office by noon on the previous Saturday.

" 6. The exact hour at which carriage is required should be stated in the re- " quisitions. Animals are not to be kept standing about unnecessarily, and the " indenting officer is responsible that carriage is at once returned to the trans- " port lines if it is not used at the hour named in the requisition.

"7. Under no circumstances is any one, except the driver, allowed to ride on " a transport cart, and cart and pack mules are on no account to be taken at a " faster pace than a walk.

" 8. When requisitions are made for carriage at places not well defined, *i.e.*, " other than Quarter Guards, Hospitals, Rest Camps, Arsenal, Gun Carriage " Factory, Small Arms Ammunition Factory, or Railway Stations, some respon- " sible person should be sent to the Transport Lines to take over such carriage.

" 9. Carriage for regiments moving in course of relief should be indented " for on Commissariat-Transport Forms 25 (British Troops) and 25-A (Native " Troops). These indents will be filled in after ascertaining from the Trans- " port Officer what description of carriage will be available.

"10. Transport drivers are not to be required to load animals or carts. " Their duty is to hold their animals while the loading is going on. Regiments " and departments must make their own arrangements for loading and unloading " and custody of baggage and stores including bedding for men on guard.

" 11. Transport drivers are on no account to be struck or abused. Any " neglect on their part should be brought to the notice of the Transport Officer " or dealt with by Commanding Officers in the case of transport attached to " regiments and batteries. The Chief Commissariat Officer will inform the " General Officer Commanding of any instances of ill-treating transport drivers " which may come to his notice."

NO.

Counterfoil.

(To be kept as a record by Indenting Officers.)

No.

Date

Description of Carriage.

When and where required.

No. REQUISITION FOR CARRIAGE. **(Local.)**

DESCRIPTION OF CARRIAGE.	Number	When and where required (exact time to be entered).	To proceed to	Probable duration of work in hours.	Description and weight † of stores.	Authority.	REMARKS.
* Pack Mules to carry 160 lbs.							
Mule carts . do. 800 „							
Bullock carts do. 800 „							
Pairs of bullocks, without carts.							
Dandis with 4 bearers ...							
Ambulance carts							
Do. tongas							
Camels to carry 400 lbs. ...							

Certified that the above carriage is intended solely for the purpose mentioned.

STATION_____

*Date*_____

Signature of Indenting Officer.

N.B.—Carriage for Regiments, &c., marching on relief should be indented for on Commissariat-Transport Forms Nos. 25 (British Troops) and 25-A (Native Troops).

Carriage for private use to be indented for on Commissariat-Transport Form No. 27.

* *N.B.*—Pack mules should invariably be indented for, unless the stores are unsuitable for mule loads, in which case the words "The $\frac{\text{Stores}}{\text{Baggage}}$ are unsuitable for pack mule loads" should be inserted above the signature of the Indenting Officer.

† This may be approximate if the exact weight cannot be given.

(NOTE.—*Reverse of local requisition form.*)

Comply.

D. A. C. G.

or Subordinate in charge Transport Lines.

Complied with and carriage returned at M

Date *Indenting Officer.*

N.B.—The driver in charge of the carriage will present this form to the indenting party, and as soon as the work is finished, the requisition is to be signed as "Complied with" and returned to the driver in charge.

The drivers are not to be asked to load animals or carts. Regiments and departments must make their own arrangements for loading and unloading baggage and stores (including bedding of men on guard) and for safe custody of the same during transit.

It is advisable to send some pack mules when available to all field days when blank ammunition is fired. The troops thus get the opportunity of distributing ammunition under service conditions, and the mules become accustomed to the noise of the firing.

Mules to be trained to stand fire.

Transport carriage is allowed to be hired by Civil and Military Officers under the provisions of paras. 1985, 1938-A, and 1990, A. R. I., Vol. V. The Government of India are endeavouring to extend this system and have called on Local Governments to frame proposals for utilising military transport for civil work in peace-time on the understanding that it will be handed back if required for field service.

Hire of Government carriage.

This question is difficult to arrange, the greatest difficulty being that the hired carriage contractor and the native owner can, by starving and over-working their animals, supply carriage at rates on which it would be impossible to keep and feed Government animals. The initial cost of a pair of bullocks to draw a country cart is very small if the cartman buys at the right time, and he does not care if he wears them out quickly as long as he can make them pay while they are alive. Municipalities and other Civil bodies representing rate-payers are bound to go to the cheapest suitable market for their transport work, and it seems almost impossible that Government transport, which must always be kept efficient and ready for field service, can work at the same rates as the Municipal Contractor's badly-fed and over-worked animals.

Para. 2077, A. R. I., Vol. V, gives the rules for supply of carriage to troops marching on relief, &c.

Para. 1986, Vol. V, deals with the rates to be charged for hired carriage to Native Regiments marching in: Bengal.

Advice notes.

When transport is handed over to a regiment proceeding on the march, an advice note will be sent (Commissariat-Transport Form No. 14) setting forth various details as directed in para. 2085, Vol. V. An advice note should also be invariably sent with public or hired transport proceeding independently on the march with Government stores (para. 2087).

Equipment Reports.

Para. 2088 lays down the procedure when hired carriage is supplied to regiments, and para. 2086 provides that equipment reports (Commissariat-Transport Form No. 15) in duplicate should be made out by despatching Commissariat-Transport Officers. One copy is to be sent to the Examiner of Commissariat Accounts, and the duplicate to the Commissariat-Transport Officer at the station of destination. The equipment report is quite distinct from the advice note (or itlanámáh).

Spare percentage.

Five per cent. of spare carriage is allowed for ordinary marches, and 10 per cent. on field service.

Responsibility of Commanding Officers for Regimental Transport.

Officers Commanding Corps are responsible for the condition and general efficiency of the transport attached to their regiments either in cantonments or on the march. G.O. No. 46 of 1890 directs that Commissariat Transport Officers, on taking over transport from a corps, should report to the General Officer of the Command the number of animals unfit for work from galls or sore backs. In the case of Executive Commissariat Officers, the report will be made through the Chief Commissariat Officer of the district.

The following are some suitable instructions to be attached to the advice note by despatching officers for the information of the Officer Commanding a Corps. These instructions are generally issued by Commissariate-Transport Officers under the orders of General Officers Commanding Districts or Officers Commanding Stations.

MARCHING INSTRUCTIONS TO CORPS.

To

The Officer Commanding,

Regiment,

Battery.

MEMO.

Please note that your Indent No. _____ of the _____ has been passed for—

——Pack Mules,
——Draught Mules,
——Army Transport Mule Carts,
——Camels, &c.,

and that the animals, carts and establishments as detailed in the accompanying advice note have been this day handed over to *Lieutenant* / *Sergeant* with complete saddlery and line gear in good order.

2. The artificers have been provided with tools and repairing materials as noted in the accompanying list.

Good condition. ——
Fair condition. ——

3. The condition of the animals is as marginally noted.

4. In accordance with para. 1813, Vol. V, please select for the supervision of the transport a Regimental Transport Officer and Assistants from those who have passed the prescribed course of training at a Transport Depôt.

5. On arrival of the regiment at _____ the transport should be handed over to the Chief Commissariat Officer / Executive Commissariat Officer at that station, with the advice note duly completed and endorsed with the numbers of animals unfit for work from galls or sore backs and the general condition of animals, carts and gear. This information is required for communication to the General Officer Commanding the District under the provisions of G. O. No. 46 of 1890, and its correctness should be acknowledged by the signature of the officer taking over the transport.

6. Care should be taken that the animals and carts are not over-loaded, that the pack saddles are kept properly fitted and stuffed, and that the feeding, watering and grooming of the animals are carefully attended to. The spare animals on the line of march are only to be used to replace casualties, and under no other circumstances are to be loaded, nor under any circumstances ridden.

7. Whenever possible, laden pack animals should be allowed to move separately without being fastened together, the quietest animals being let loose after the first two days and precautions taken to prevent their straying from the road.

8. It is noted that _____ Officers and Non-Commissioned Officers who have passed at Transport Training Depôts accompany the regiment, and there should be no difficulty in carrying out satisfactorily the usual routine for transport on the march. Careful attention must be paid to the adjustment of loads to prevent galling.

By order.

(Signed)

Routine and Discipline on the March.

Routine on the march.

The following rules regarding the care of transport on the march are applicable to peace and service conditions :—

In the early morning the litter should be swept up and collected in heaps ; the remains of the fodder should be collected, and the best of it put down before the animals.

The grain ration should be divided into three feeds ; one pound should be kept over from each day for the early morning feed, which should be placed in the nose bags over night.

On the rouse sounding, the animals should be fed and saddled. It is important that animals should have something to eat before they start in the morning, as they may be delayed on the road, and a prompt supply of forage is not always forthcoming at the next camping ground.

Petty Officers and Regimental Transport Assistants should see that the saddlery is properly fitted before the animals are distributed to companies.

Loading should be done simultaneously, and not a moment sooner than necessary, so that the animals will not be kept standing under their loads.

Pace of different animals on the march.

The Commissariat Field Service Code lays down the pace of transport animals as follows :—

Mules	...	... 3 miles an hour.
Camels	...	... 2 do.
Pack bullocks...		... 2 do.
Carts drawn by bullocks ...		1½ do.

Discipline on the march.

Rules regarding transport discipline on the march are fully detailed on pages 124—127 of the Commissariat Field Service Code. Every Transport Officer should be thoroughly conversant with these rules, but for ready reference a few of the most important are detailed.

On field service every load or package should be clearly defined and distinctly marked with the name or regimental number of the owner and with the name of the corps or department to which it belongs ; this marking or labelling will devolve on the corps, department or individual to whom the load or package belongs.

Every transport animal or cart should have a leather label attached to it showing the corps, brigade, &c., to which it belongs ; this label will be supplied by the Commissariat-Transport Department.

The label will consist of a simple piece of stout leather fitted with a metal eyelet hole and a bit of whipcord and will be stamped as under :—

_____ Division.
_____ Brigade.
_____ Regiment, Battery or Department.
_____ Company or Troop.

The designation will be completed in writing, on mobilisation by the regiment, battery or department concerned.

Ammunition, quarter-master's stores, rear and quarter guard tents, &c., are loaded by fatigue parties who would probably form the baggage guard. Dándi

bearers (if available) load and pack the hospital tents. If not, a fatigue party does the work.

The normal order of march for the transport of a regiment moving *singly* is as follows, subject to such alterations as may be considered necessary by Officers Commanding Corps or Brigades to suit particular cases :—

1*st.*—Reserve ammunition (both 1st and 2nd).
2*nd.*—Water mules.
3*rd.*—Signalling equipment.
4*th.*—Entrenching tools.
5*th.*—Field stretchers and regimental ambulance transport.
6*th.*—Cooking utensils.
7*th.*—Tents.
8*th.*—Kits.
9*th.*—Supplies.
10*th.*—Spare animals.

If the second reserve of ammunition is not to accompany each regiment, but to march with the baggage, it should precede *all* other baggage.

In the march of a brigade the first five items usually follow immediately in rear of each regiment.

Divisional and Brigade Transport Officers are to be considered the baggage masters of their respective divisions and brigades.

The Regimental Transport Officer will remain with the baggage of his own corps. He has in his charge one half of the spare transport of his corps, *i.e.*, 5 per cent., and his spare transport marches in rear of the baggage of each regiment. The remaining spare transport is never made over to Regimental Transport Officers, but is in charge of the Brigade Transport Officer, who, on the line of march, sends it with the Officer Commanding the rear guard, who will report to the Brigade-Major, on arrival in camp, the number of loads (if any) he has picked up and to which corps they belonged.

Animals throwing their loads, or otherwise getting disabled, are on no account to be allowed to remain in the road-way, but must immediately be cleared to one side, and the loads there re-adjusted, so that the animals in rear be not stopped, but kept moving steadily on.

All cases of over-loading or bad loading are to be promptly brought to the notice of the General Officer Commanding the Brigade by Brigade Transport Officers, also any cases of soldiers or followers unauthorizedly riding animals.

Followers of every description should be kept to the road, and not allowed to halt when once the march has commenced ; otherwise they are apt to stray in search of water and to injure crops, vegetables, &c.

A Transport Officer, in order to become acquainted with the actual condition of his animals and their loads, will, at intervals during the march, halt and allow the whole of the animals to pass him and observe whether loads are over weight and if they are properly adjusted.

On arrival in camp, baggage is not to be allowed to halt on the encampment ground, but to one side of it. If marched direct on to the ground where the

tents will subsequently be pitched, the camp colour men cannot properly perform their duty. Moreover the animals defile the places on which men subsequently have to sleep or cook.

When a bad piece of ground or obstacle, such as a defile, pass, bridge, stream, &c., has to be crossed, Transport Officers will at once go to the head of their respective baggage columns to see that the obstacle is properly passed. At such places it is most important to move fallen loads to one side, so as not to delay animals coming up in rear.

Jemadárs and duffadárs of sections should be made to march in rear, and not in front, of their respective squads.

Halts should never be made before passing a bridge, river, village or defile, but invariably afterwards. Unless absolutely necessary for some military reason, baggage columns should never be halted at all after being once put in motion. It is not rest to the animals, rather the reverse, unless the loads are taken off, which may not be possible.

Spare animals on the line of march are not to be used for any other purpose than for the relief of broken-down or distressed animals. Brigade and Regimental Transport Officers are responsible that the spare animals are really spare, and not loaded up with extra kit, for which no carriage has been provided by regulations.

Arriving at the end of a march, close to a village, bridge, or defile, a convoy should always be encamped on the further side, for it will be found easier to issue from these difficult places, whilst the convoy has already attained an orderly formation, than to encounter the difficulty on the morrow in the dark at the commencement of a march.

The following points require the special attention of officers on baggage and rear guards :—

1*st.*—That all soldiers of the baggage guard be instructed that it is their duty to replace fallen or displaced loads, and not to leave this work to be performed by the rear guard only.

2*nd.*—That soldiers and transport followers be not permitted to over-drive baggage animals ; thus in the case of camels, drivers dragging the leading rope, so that some of the animals have to travel with outstretched necks, causes serious injury and should be checked at once ; in fact, the slowest camel should always be the leading one.

3*rd.*—That the baggage animals are not tied in long strings. Each driver should lead or drive his own animals, and these, when passing over difficult ground, should be unfastened, if necessary, and the animals allowed to get over the difficult ground by themselves instead of being dragged along by being tied to other animals.

4*th.*—That spare animals be only used to replace casualties, and not otherwise loaded or ridden.

Driving pack animals in droves.

It is important that mules, ponies, pack bullocks and donkeys should be driven in droves. This practice saves the animals greatly, particularly on rough

and difficult roads. Mules and ponies give trouble at first, and judgment must be exercised in letting them loose. After the first two days' march, when the mules have settled down, the quietest animals should be allowed to go free and the number gradually increased. Precautions must be taken to prevent them straying from the road. When mules know the road they are marching on, they give very little trouble and make for the next camping ground. On strange roads they do not go so well.

It is very difficult to teach mules to walk loose in Cantonments. They know their way to their lines, and the troublesome ones frequently break away, taking others with them.

When large bodies of troops are moving, the greatest care will have to be exercised to prevent the transport of different brigades and divisions becoming mixed up.

Method of leading pack mules and ponies.

When pack mules are led, they are fastened in strings of three. The first mule is led by the bridle ; the forefoot shackles of the 2nd and 3rd mules are fastened through the ring on the nose band, and the fore foot chains are attached on alternate sides to the rear arch of the saddle of the mule in front. Drivers should be taught to lead their mules from the near side, to walk by the animal's shoulder, and not to drag the mule after them. Of course on narrow paths the driver must go in front, but on broad roads a mule properly led will walk much faster than when dragged along by the driver. The slowest walker of the three mules should be put in front, provided he leads fairly well.

Transport carts should never be moved faster than a walk.

Routine on arrival in camp.

On arrival in camp, after the loads have been removed, loosen the girths and shift the saddles slightly on the animals' backs. They can then go to water, while the spare men lay out the lines. If the animals are not cool on return from water, fasten ten or twelve, one behind the other, and secure the fore foot shackle and chain of the first animal to the saddle of the last one. They will then walk quietly round in a circle, and one driver standing in the middle can keep them on the move. This is an Indian custom and is universally commended. **Although natives of India are apt to be very careless with their animals, they do not fail to recognise the fact that tying up a heated animal is a very dangerous practice.**

When the animals are cool and their backs nearly dry, remove saddles and groom and feed as in cantonments. Special attention should be paid to the grooming of the back where the pack saddle has rested on it, and this part should be kept thoroughly clean and the hair should not be allowed to get matted.

In the day-time the pads of the saddles should be exposed to the dry air and carefully examined each day by the Transport Officer in charge ; whenever the pads seem hard or lumpy, the wool should be taken out, hand-teased, and re-adjusted. This does not take long, and drivers should be taught to do it themselves.

All wounds and galls should be at once reported to the Transport Officer and saddles examined to ascertain the cause of injury (see Lecture XVI).

Water again at 4 P.M. Evening stables from 5 to 5-45 P.M., then feed and put down fodder for the night. **Be careful to remove all stones from the animals' standings.**

See that all animals are feeding properly, and that in the case of camels and bullocks the slow feeders get their proper share. If animals do not feed well after a hard day, it shows that their strength has been over-taxed.

Line sentries should be posted at night as recommended in Lecture IX.

Try and arrange to always draw a half ration of grain in advance, so that a feed can be taken on the march to be given either during a convenient halt or after arrival in camp.

Visiting lines by night on the march or on field service.

A Transport Officer, Non-Commissioned Officer or Agent on the line of march or on field service, in charge of animals, should make a point of going round his animals at night before he turns in.

He should then note the following points :—

Are the sentries alert ?

Are the animals properly picketted ?

Are the jhools securely fastened on ?

Are the animals feeding except those lying down ?

Do any of them show signs of pain or sickness ?

Are any animals coughing badly ?

Is the hay or bhúsa within reach of the animals ?

(This is important, as the fodder often gets pushed out of reach by the animals' noses, and the sentries do not think of putting it back.)

If your subordinates know that you are in the habit of coming round at night, they will keep things in proper order. Otherwise everything will be left to chance, and, as likely as not, many animals will be deprived of their jhools, which will be used as bedding by the drivers.

Scales of transport for field service.

The amount of transport allowed on field service for the different arms is fully detailed in the Field Service Equipment Tables of 1891.

Veterinary inspection of animals proceeding on field service.

In accordance with paras. 749 and 749*a* of the Commissariat Field Service Code, all transport animals will be inspected by a Veterinary Surgeon before being sent on field service.

The subject of carriage on the lines of communication is dealt with on pages 119—122 of the Commissariat Field Service Code. Stores are despatched from the base under the three following arrangements, preference being given to whichever system is the most expedient under the circumstances :—

I.—On Government carriage in charge of a Transport Officer or subordinate. This is termed a convoy.

II.—On Contractors' carriage in charge of the carriers.

III.—On Government or hired carriage laid out at stages, each detachment working on its own stage, and not from end to end as the case of I and II.

Complete rules for hired transport on field service are laid down in the Commissariat Field Service Code, pages 98, 99, 100, 101 and 102.

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LECTURE XXI.

Conveyance of Transport Animals by Rail. Care of Animals on Railway Journeys.

Carriage of transport animals by rail.

The standing transport of the Indian Army being spread in peace-time over a large area, we must consider the question of its speedy concentration when required for field service, and in this event, precautions must be taken to ensure the animals and gear arriving at their destination in an efficient state, so that they can at once be utilised for the work of a campaign.

Transport animals are conveyed by rail as follows:—

On Broad-gauge Lines.

10 Mules or ponies ... ... } in each covered waggon.
8 Bullocks ... ... }
4 Camels ... ... to a waggon.

On Narrow-gauge Lines.

8 Mules or ponies ... ... } in each covered waggon.
6 Bullocks ... ... }
2 Camels ... ... to a waggon.

Camels are carried in open waggons. If the side of the waggon is constructed to open, the camels are walked in; otherwise they must be slung by a crane. Camels are placed in a sitting position in the waggons, heads facing inwards, and are secured by a rope, tying down the fore legs and passing over the neck Great care must be taken to prevent the forage being set alight by sparks from the engine. One driver is allowed in each waggon with the camels.

Half the number of mules, ponies and bullocks are placed on each side of the waggon, facing inwards, leaving a space or passage from door to door.

The animals are fastened to breast bars, which run across the waggon, and are fixed on either side of the door.

Bullocks are given more room than mules and ponies, so that they can lie down during the journey. A mule or pony can stand for days at a time, but a bullock cannot do this and must be allowed to lie down.

When despatching animals by rail, the following rules should be observed:—

1. Send a competent man to the station some hours before the train is timed to start. He should see that the waggons have been properly cleaned, that the fittings of the breast bars are in proper working order, and that the chains and hooks for opening the windows and fastening back the doors in hot weather are complete. Carriage examiners frequently overlook these details, and delay and inconvenience are caused when such omissions are only discovered at the last moment.

2. If animals are despatched from a depôt, it is best—if carriage is available to convey it to the station—to pack the saddlery, &c., before the animals leave the lines. Delay at the station will thus be avoided.

3. Each driver should securely pack the saddlery and line gear of the animals in his charge in his tarpaulin and secure it with one of his loading ropes.

He should leave out—

For Mules and Ponies.

Head-collars and eye-fringes ... } on the animals.
Fore-foot shackles and chains... }

Nose-bags.

Canvas bucket.

For Bullocks.

Head-ropes ... ... } on the bullocks.
Eye-fringes ... ... }
Feeding cloths ... ... }

For Camels.

Jhools

Canvas sheets.

Leading ropes and head-stalls... on the camels.

4. Each package of saddlery and gear should be marked outside in chalk or paint with either the register numbers of the animals or the name of the driver. This will facilitate a correct re-issue on arrival at destination.

5. On reaching the Railway Station, the animals should be placed opposite the waggons in which they are to be loaded and the entraining should commence.

6. The orthodox way of putting a horse in a waggon is for two strong men to join hands behind his quarters and push him in, a third man keeping his head straight. It will be found, however, that drivers frequently get kicked if this system is tried with mules and bullocks, and the following is a safer and moreover an equally efficacious method :—

Take 2 ropes 20′ long and $\frac{3}{4}$″ diameter and secure the ends to each door-post about 2′ above the floor of the waggon. Bring the animal close to the waggon with his face towards the door. Two men should then bring the ropes behind him and cross them above his hocks. They should then pull in opposite directions parallel with the side of the waggon. When this method is applied, the animal cannot avoid entering the waggon if his head is kept straight.

7. As a rule, mules, ponies and bullocks will enter a box quietly, and the above measure need only be taken with refractory animals. As soon as the animals enter the waggons, they should be placed in their proper places ; when half the waggon is full, the breast-bar should be put up. The fore-foot chains should be passed through the nose-band rings of the head collar and secured to the rings of the breast-bar. As soon as the animals are properly secured, the other half of the waggon should be filled. Bullocks are secured to the breast-bars by their head-ropes.

8. Mares and stallions should not be loaded in the same waggon.

9. With mules, ponies and bullocks two drivers are allowed in each waggon, the balance of drivers and petty officers travel in a third-class compartment, and the Railway authorities must be previously indented on for sufficient accommodation for them. Two metal buckets are allowed to every cattle waggon.

* All animals sent by rail are allowed 6 lbs grain & 16 lbs bhoosa per diem.

10. The packages of saddlery and gear are next packed in spare waggons to be provided for this purpose. Grain and forage should be stowed opposite the doors of the waggons, so that it will be easily accessible on the journey.

11. Animals are allowed the "command" scale of rations on railway journeys. As a rule, it will be sufficient to take two days' forage in the train. If more is taken, considerable expense will be incurred for its carriage as it takes up a lot of room. Any further supplies of forage required for the journey can be obtained at intermediate stations where there are Commissariat agencies. The officer or subordinate in charge of the animals should telegraph a-head to have the forage ready at the station on arrival of the train.

12. The grain should be crushed, and the fodder should, as far as possible, consist of bhúsa or chaffed hay, so that the animals can feed from their nose bags throughout the journey.

13. The animals should be watered and fed before being entrained, except in the case of camels, which have to be slung.

14. A bag of bhúsa and chaff should at first be put into each waggon to be replenished from the forage waggon.

15. Due notice should be telegraphed to stations where the animals are to be watered. The Railway authorities will make arrangements for the supply of water. 8 a.m. and 3 p.m. are good hours for watering and feeding. On arrival at a watering station, the drivers should bring all feeding bags to the waggon containing the grain. While the animals are being watered, a half ration of crushed grain should be distributed in the feeding bags and mixed with bhúsa or chaff. The feeding bags can be put on the animals just before the train starts, and they should be kept filled with short fodder when the grain feed has been consumed. A halt of about 40 minutes is necessary for feeding and watering.

16. It is difficult to keep the waggons clean on a Railway journey, as there are no facilities for removing the droppings. Horse-boxes are fitted with trap-doors behind the animals, and some arrangement of this sort should be made for waggons intended to carry transport animals.

17. **Discretion must be used in ventilating the waggons. In hot weather every door and window should be opened and secured. Neglect to do this has sometimes resulted in the animals being suffocated. In very cold weather the doors may be closed, but the windows should be left open for ventilation. It is not necessary in India to clothe animals in covered waggons, as the combined heat of their bodies keeps up the temperature of the waggon. Camels are carried in open waggons and should be clothed when the nights are cold.**

18. The drivers who travel with the animals should not be allowed to smoke as they might set fire to the forage. Before the trains start, they should be paraded and all matches taken from them.

19. On arrival at the destination, the gear should first be removed, and saddles laid out ready for saddling. The animals should then be led out of the waggons.

A few medicines to meet emergencies during the journey should be handed over to the officer or subordinate in charge of animals proceeding by rail.

Medicines, etc., for railway journeys.

For 100 mules, ponies or bullocks, the following will suffice :—

10 oz. of nitric ether as a diffusible stimulant for exhausted animals, or to relieve colic, or as a sweating draught in cases of fever. Dose—one oz. in a pint of water.

One quart of carbolic oil, 1 oz. cotton wool, 1 lb. of tow, 5 pairs flannel bandages, 5 pairs cotton bandages, 5 yards of dasúti cloth, a sponge, basin, drenching bottle and fomenting pad.

With the above appliances, cuts, sprains and bruises can be temporarily treated as described in pages 103 and 104.

For 100 camels, 1 pint nitric ether, 1 gallon carbolic oil, 2 lb. tow, 10 yards dasúti cloth, sponge, basin, drenching bottle and fomenting pad are required.

If a salútri accompanies the animals, he will take his veterinary dressing case with him.

LECTURE XXII.

Regimental and Depot Transport. Regimental Transport Training. Correspondence and Returns in Cantonments and on Field Service. Inspection of Depot and Regimental Transport.

(NOTE.—For illustration of this lecture we require—
Commissariat Field Service Code.
A. R. I., Vol. V, Commissariat.
Commissariat-Transport Forms Nos. 5 (a to e), 6, 13, 18, 19, 30, 32, 33 and 44.
India Army Form No. 50.
Commissariat Form No. 56-B.
Commissariat Field Service Forms Nos. 1, 2, 7, 8, 14, 15, 16, 20, 21, 22, 35, 37, 38, 39, 40, and 41.

Regimental transport.

Transport in regimental charge is under the direct control of the General Officer Commanding the District in which the regiment is serving. (Para. 1808, A. R. I., Vol. V.)

Officers Commanding Corps are fully responsible for the condition and efficiency of all transport animals and equipment placed in their charge.

Inspections.

Chief Commissariat Officers will have general supervision over carriage in regimental charge. Officers Commanding Regiments and Batteries are to afford every facility, on due notice being given, for the inspection by Commissaries-General as well as by the Chief Commissariat Officer of the transport in regimental charge. (Para. 1816, Vol. V.)

Supervision of regimental transport by Officers of the Commissariat-Transport Staff.

Although the Commissariat-Transport Officer at a station may be unable to exercise a very close supervision over the animals employed in various parts of a large cantonment, he should still consider it his duty to observe their condition, as he has or can find opportunity for so doing, and to make any suggestion he may think desirable to the officers under whose immediate control the animals may be, or, if necessary, to the Officer Commanding the Station. (Clause 2 of Para. 1982, Vol. V.)

Regimental Transport Officers and Assistants are allowed, under paras. 1811 and 1813, A. R. I., Vol. V, and their pay is detailed in the latter para.

The charge of *hired* transport does not entitle either officers or transport assistants to any allowances.

Returns, etc., for regimental transport.

Transport Assistants will assist the Regimental Transport Officer in the transport instruction of the corps. Those assistants who can read and write English will assist in the preparation of the following returns, documents, &c. :—

I.—Morning report of establishment and animals (Commissariat-Transport Form No. 5 (*a* to *e*).)

II.—Leave certificates (Commissariat-Transport Form No. 32).

REGIMENTAL TRANSPORT RECORDS.

III.—Completion of service books (Commissariat-Transport Form No. 30) of all followers.

IV.—Complete descriptive register of followers (Commissariat-Transport Form No. 18).

V.—Complete descriptive register of animals (Commissariat-Transport Form No. 19).

VI.—Monthly rolls, which must be completed and submitted to the Regimental Transport Officer on the last day of each month (Commissariat-Transport Form No. 6).

VII.—Acquittance rolls (Commissariat-Transport Form No. 13), which will be commenced at least three days before the end of the month to which they pertain, and in which transfers, deaths, desertions, &c., will be duly noted.

VIII.—Monthly present state of transport animals.

X.—Return of gear in use.

X.—Miscellaneous documents, such as monthly contingent bills, indents for gear, &c.

[NOTE.—The Transport Assistant will not be allowed to retain charge of a follower's service book for a single day for the purpose of posting entries; if necessary, the followers will attend at the Regimental Transport Office, hand in their books one at a time, wait till the entries are made, and receive their books back then and there. It is to be a strict rule that men are never to be without their service books. (Para 1814, Vol. V.)]

A defaulter book (Commissariat-Transport Form No. 33) will be kept up by each depôt, out-station, or regiment supplied with transport carriage, in which every offence committed by transport attendants will be recorded. (Para. 1894, Vol. V.)

Morning reports (Commissariat-Transport Form No. 5 (*a*) to (*e*)) will be inspected daily by Officers Commanding Corps. (Para. 1818, Vol. V.)

Transport instruction in regiments.

The training of corps in packing and loading and general management of transport will be carried out regimentally by the Regimental Transport Officer under the orders of the Commanding Officer (G. O. No. 46 of 1890, and para. 1812, Vol. V).

The following circular by the Chief Commissariat Officer, Poona District, gives an idea of the transport training which should be carried out in regiments :—

CIRCULAR MEMO. No. $\frac{\text{B-13}}{5383\ \text{A}}$.

CHIEF COMMISSARIAT OFFICE, POONA DISTRICT.

Poona, 16th August 1892.

Subject—*Transport Training—Regimental.*

The following instructions are circulated for guidance in regimental transport training :—

" 1. Two classes will be assembled annually in each regiment and battery " quartered in the Poona District.

TRANSPORT TRAINING IN REGIMENTS AND BATTERIES.

" Each class will consist of at least 6 non-commissioned officers and 24 men " per regiment, and 2 non-commissioned officers and 5 men per battery.

" 2. The instruction will be carried out by officers and non-commissioned " officers who have passed the transport training course laid down in para. " 1781, Vol. V, A. R. I.

" 3. The following text-books have been distributed to regiments and bat- " teries and can be taken as a general guide for instruction, allowance being " made for changes of regulations since their publication :—

" (*a*) Transport Packing and Loading (Hayter and Kelly).

" (*b*) Handbook for Transport Training Classes (Clifford).

" (*c*) Manual for Regimental Transport Training (Wickham).

" 4. The instruction of regimental classes will extend over eleven working " days, and will consist of—

" 1ST DAY. Instruction in the names and authorized scales of the " various articles of saddlery and line gear of transport " animals, and explanation of the materials of which they " are manufactured. (1½ hours.)

" Lecture on the object of Transport Training. The " necessity for transport knowledge in regiments. The " various animals used for transport work and their " weight-carrying power. (1 hour.)

" 2ND DAY. Explanation regarding fitting pack-saddles. Practical " fitting and stuffing of pack saddles and adjustment of " saddlery. (1½ hours.)

" Lecture on stable management, including daily routine, " standings, picketing, grooming, exercise, watering and " feeding. (1 hour.)

" 3RD DAY. Continuation of fitting pack saddlery. Explanation " of the adjustment of line gear on the animals in addition " to their loads. (1½ hours.)

" Lecture on grain and forage used in India and the pre- " paration of food before it is given to animals. Author- " ized scales of forage. (1 hour.)

" 4TH DAY. Explanation of the principles of packing and loading, " with practical illustrations. Preparations of suitable " loads. (1½ hours.)

" Lecture on the care of animals, with explanations of " the signs of health and sickness. Instructions in the " treatment of a few ordinary diseases, such as indigestion, " debility, colic, fever, catarrh ; also treatment of wounds " and bruises. (1 hour.)

" 5TH, 6TH, 7TH, & 8TH DAYS. Packing and loading the various loads of military bag- " gage, camp equipage and stores on different animals " (*three hours each day*).

" 9TH DAY. Instruction in loading carts, fitting draught harness and
" rules for driving ; practical driving lesson. (1½ hours.)
" Lecture on shoeing mules, ponies, and bullocks. Ex-
" planation of special faults to be avoided. (1 hour.)

" 10TH DAY. General résumé of work.

" 11TH DAY. Practical examination.

" 5. The necessary animals and appliances for the class will be supplied " on application to the Transport Officer at Poona. The Executive Com- " missariat Officer at Ahmednagar and the Commissariat Warrant Officer at " Sattara will also supply animals and afford any assistance which may be " required.

" 6. In addition to the above classes, packing and loading will be practised " once a week in each regiment and battery by such number of men as can be " spared for the work. If from any cause transport animals are not available, " the weekly instruction will consist of packing tents and various articles of " baggage in suitable loads, and other theoretical instruction.

" 7. Commissariat Transport Officers will attend regimental instruction " when their other duties permit, and give such assistance as may be required. " When regimental classes are assembled, intimation should be sent to the Chief " Commissariat Officer, Poona, in the case of Regiments of the Poona Garrison, " and to the Executive Commissariat Officers at out-stations.

" 8. Officers Commanding Corps in the Poona Garrison and the Officers " Commanding at out-stations will, on the last day of each month, forward to " the Chief Commissariat Officer, for the Major-General's information, a report " showing the progress made in transport training during the month.

" By order,

" Signed

" Chief Commissariat Officer."

Returns of gear by regiments.

Regimental Transport Officers will furnish annual returns of gear in use with transport animals under their charge to the Chief Commissariat Officer, in duplicate, on the 1st April on Commissariat Form No. 56*b*. They will also prepare annual returns on Commissariat-Transport Form No. 44, in duplicate, of ordnance pattern harness and saddlery in their charge on 1st April, and submit them to Chief Commissariat Officers. (Para. 1817-A, Vol. V.)

Inspection of Regimental and Depôt Transport by General Officers Commanding.

General Officers Commanding Districts will, under the provisions of G.O. No. 46 of 1890, para. 8, make careful inspections between 1st January and 31st March and 1st July and 31st September of all the transport, personnel and materiél, within their commands, bringing to notice of the Commissary-General any defects noticed, and embodying the result of this reference in a detailed report (I. A. Form 50) to be submitted by the 1st April and 1st October through the Commissary-General for the information of His Excellency the Commander-in-Chief.

INSPECTIONS BY GENERAL OFFICERS COMMANDING.

The following points should be particularly noticed :—

I.—Depôt and Regimental Transport Staff. Whether competent, zealous and efficient.

II.—Subordinate Establishments. Whether carefully trained and competent in respect of details of loading and packing ; care in feeding, grooming and fitting harness to animals ; skilled and sufficient for the maintenance and repair of vehicles, harness and gear ; shoeing and the veterinary treatment of sick animals.

III.—Animals of all classes. Age, size, condition, general fitness, feeding, grooming, exercise or ordinary work.

IV.—Carts and other vehicles. Condition and whether kept in good repair by the authorized establishments.

V.—Transport Lines. Whether healthy, cleanly, and free from unauthorized occupants.

VI.—Transport Training. The progress made and results obtained by the system of training soldiers to a knowledge of transport duties and the numbers of each corps trained during the half-year.

VII.—Employment of Transport. Whether the whole of the Government transport is fully employed throughout the year on authorized duties, and whether relief duties are invariably given precedence to station duties in the employment of Government transport ; the amount of extra carriage hired during the year and necessity for hiring it, and whether the Government transport is over or under worked and causes.

Commissariat Transport Officers in charge of depôts will furnish the returns of gear, &c., already detailed in Lecture XV.

The following is a list of books, files, &c., generally kept in the Line Offices of Transport Depots :—

Statement showing complement of Books, Files, etc., to be kept in the Transport Line Office.

No.	Detail of Records.	No. to be kept in Transport Line Office.	Form in which to be kept.	Period to be retained.	REMARKS.
	BOOKS.				
1	Day Book	1	Comst. Form 52	5 years	
2	Ledger	1	,, 53	5 ,,	Reserve gear kept under separate headings.
3	Copy Book of Office Order	1	....	3 ,,	
4	Copy Book of Letters Issued	1	....	5 ,,	
5	Report Book (half margin)	1	....	3 ,,	
6	Invoice of Stores Despatched (counterfoil)	1	Comst. Form 61	3 ,,	
7	Acquittance Roll Book	1	Comst. Trans. form 13	For ever	
8	Despatch Book	1	.....	3 years	

Records in Transport Line Offices.

No.	Detail of Records.	No. to be kept in Transport Line Office.	Form in which to be kept.	Period to be retained.	Remarks.
	BOOKS—*continued.*				
9	Veterinary Equipment Ledger of * Receipts and Issues and Balances of Veterinary Instruments and Necessaries. Account Book of European Bazaar Medicines	1	....	3 years.	* In India Army Form 96-B, para 1948, A.R.I., Vol. V.
10	Indent Book	1	Comst. Form 78	3 ,,	
11	Ration Indent Book	1	....	3 ,,	
12	Book of Transport Officers' Survey Report	1	Comst. Form 69	3 ,,	
13	Estimates of Repairs (Book)	1	....	3 ,,	
14	Register of Samples	1	....	5 ,,	
15	Bridge Pass Book	1	Comst. Form 167-A.	1 year	
16	Memorandum Forwarding Documents.	1	Comst. Form 156	5 years	
17	Descriptive Register Book of Permanent Followers entertained or attested	1	....	3 ,,	
18	Morning Report of Animals and Attendants	1 for each class	Comst. Form 5 A to 5 E	3 ,,	
19	Hospital Admission Certificate Book ..	1	,, 31	3 ,,	
20	Leave Certificate Book	1	,, 32	3 ,,	
21	Descriptive Roll Book of Animals ..	1 for each class	,, 19	5 ,,	
22	Shoeing Book	1	....	3 ,,	
23	Register of Indents for Carriage ..	1	....	3 ,,	
24	Sick Stables Record showing Diseases and Treatment	1	....	20 ,,	
25	Defaulter Book	1	Comst. Form 33	For ever	
26	Returning List Copy Book	1	,, 66	3 years	
27	Workshops Book showing all repairs and receipts and issues of all repairing and cleaning material	1	....	2 ,,	
28	Packing Material Book	1	....	3 ,,	
29	Sale Account Book	1	Comst. Form 139	3 ,,	
30	Railway Credit Notes (counterfoil) ..	1	,, 161	3 ,,	
31	Postage Accounts Book	1	Bengal F. 175	3 ,,	
32	Indent Book for Clothing	1	Comst. Trans. 28	5 ,,	
33	Cash Book				
34	Attendance Roll of Temporary Hired Establishments				
	FILES.				
1	Committee and Survey Report File ..	1	Comst. Form 69	3 years	
2	Miscellaneous File	1	....	3 ,,	
3	Monthly and Half-yearly Return File.	1 set of each	....	3 ,,	
4	Memorandum File	1	....	3 ,,	
5	Receipt and Issue Voucher File ..	1	....	3 ,,	
6	Advice Note of Carriage (Itlanámáh)..	1	Comst. Trans. 14	3 ,,	
7	File of Checked Triplicate Bills ..	1	....	3 ,,	
8	File of Correspondence on Service of Followers	1	....	For ever	
9	File of Receipted Carriage Indents ..	1	....	2 years	
10	File of Returns of Followers	1 set of each	Forms B, C & D	For ever	
11	File of Out-station Invoices (received).	1	....	3 years	
12	Checked Monthly Rolls of Transport Establishments and Dooly Bearers ..	1	....	5 ,,	
13	Receipt Book for Contractor's Supplies.	....	....	....	

CORRESPONDENCE AND RETURNS ON FIELD SERVICE.

Books of Reference to be kept in the Transport Lines and numbered.

1.—A. R. I., Vol. V.
2.—" Commissariat Field Service Code."
3.—*Hayes*' " Veterinary Notes" (Bombay).
4.— „ " Illustrated Horse Breaking" (Bombay).
5.—*Steel* on " The Camel."
6.—*Burn* on " Transport and Camel Corps."
7.—*Ryland* on " Army Transport " (Peace and War).
8.—*Hayter and Kelly* on " Packing and Loading."
9.—*Wickham's* "Manual on Transport Training Classes and Management."
10.—*Clifford's* Hand Book on " Transport Training Classes."
11.—*Sanderson* on " Pack Elephant Gear."
12.—*Hill's* " Packing and Loading Drill."
13.—*Elliot's* " Loading Frame Drill."
14.—A. R. I., Vol. X, Part II.
15.—List of Vouchers.
16.—Smith's Manual of Saddles and Sore Backs.

And other standard books which may hereafter be issued.

Returns on field service.

On field service the following returns are submitted :—

Daily states.

Daily state of Government or hired transport with attendance of the former, also ambulance transport—

(*a*) in regimental charge.
(*b*) with departments
(*c*) with field hospitals.

These are prepared on Field Commissariat Transport Form 37 and furnished daily by Commanding Officers of Corps, Departmental Officers and Medical Officers to the Commissariat Transport Officer of the brigade or troops to which the transport and ambulance are attached or with which associated.

Weekly states.

Compiled weekly states are prepared on the same form by Brigade Transport Officers and forwarded to the Divisional Commissariat Officer for disposal as detailed in paras. 611 and 613 of the Field Commissariat Code.

Para. 902 of the Field Service Code gives a list of the necessary documents to be furnished in support of charges for Government and hired transport detailed for field service.

Commissariat-Transport Field Service Forms.

In order to facilitate work and decrease clerical labour, a number of simple official forms have been designed for field service requirements. Sample forms are bound in books and will be found in all Commissariat Offices. The following forms have special reference to transport duties :—

No. 1—The cash book form—all receipts must be entered on the debit side, and expenditure on the credit side.

No. 2—A record of objections raised against cash accounts for want of proper vouchers, or on account of unauthorized expenditure.

FIELD SERVICE TRANSPORT FORMS.

No. 7—Is an acknowledgment form for advances of cash.

No. 8—A form of receipt for stores or gear supplied.

No. 14—An acquittance roll of payments to transport establishments, and is retained by Transport Officers as a record for future reference.

No. 15—The pay roll of native establishments; it is submitted in support of expenditure charged on account of their pay.

No. 16—A letter form; the counterfoil is retained by Transport Officers as a record.

Nos. 20 & 21—Are the ration indents for officers, animals and establishments: attention is invited to the certificate, marked A, in the margin of form 20.

No. 22—Is the authorized form for indents on field service, ration indents excepted.

No. 35—Is the way bill used for consigning stores by convoy of Government transport or by hired carriage. The necessary instructions are detailed on the face of the bill, and should be carefully noted by despatching and convoy officers.

No. 37—Is the form for daily and weekly states already referred to.

No. 38—Is a transfer statement to be filled in when hired transport animals and attendants are returned from the front, or discharged either from sickness or on account of their not being further required.

No. 39—Is a muster roll and pay bill form for hired transport. The instructions on the first page should be carefully noted.

No. 40—A pay roll for hired coolies.

No. 41—A descriptive roll of hired animals and attendants.

All the above forms are separately bound in books, and Transport Officers should apply for them to Chief Commissariat Officers before starting from the base depôt (also see Ryland, pages 99—101, where further details are given).

LECTURE XXIII.

Ambulance Transport.

(NOTE.—For illustration we require one Collis' dandi, an ambulance tonga, a field stretcher, a 4-wheeled ambulance, and a camel with kajáwahs for sick men.)

The following descriptions of carriage are used in India for transport of sick and are supplied by the Commissariat-Transport Department.

A. *Dandis*—Light stretchers swung from poles and carried by bearers.

B. *Field stretchers* for removing sick and wounded men to dressing stations and field hospitals.

C. *Covered jhampans* or chairs for use in the hills.

D. Tongas with curricle draught for mules, and yoke draught for bullocks.

E. *Covered 4-wheeled ambulance carts* used for cantonment work.

F. *Camels* fitted with kajáwahs to carry a man on each side.

G. *Mules and ponies* with riding saddles.

H. *Indian country carts* drawn by bullocks and fitted with covers of matting and used for transport by road of sick and convalescents.

Dandis.

The best pattern of dandi and the one which is now in general use is the "Collis'" pattern.

It is light, strong and fitted with a cover and curtains, which can be removed and made to form a small tent.

A hammer and pegs fit into a pocket in the dandi for pitching the tent.

Bearers.

Six bearers are allowed for a Collis' dandi on service, and four in cantonments and on relief marches in India.

Six bearers may, however, be allowed for relief marches, provided they can be spared and that extra establishments are not kept up in consequence.

In order to carry a dandi smoothly, the bearers should break step. Four men carry a dandi at a time and are relieved by the two spare men, one of whom walks in front and warns the carriers of any unevenness or obstacle in the road.

Service field stretchers.

The service field stretcher is made of canvas and light wood. They are carried by the trained stretcher bearers of corps.

Two men are required for each stretcher.

Jhampans.

Jhampans or hill chairs are used at the various Indian hill depôts for convalescents. Four bearers are required for each jhampan.

Tongas.

Tongas are used as ambulances on field service and also in cantonments and on relief marches.

They are principally drawn by bullocks, but a few are also fitted for mule draught.

Mule tongas.

The objection to the use of mule tongas is that their supply in cantonments invariably results in a continued and unnecessary demand for them from the garrison in general on various

pretexts; while on service, if mule tongas were available, the Commissariat Transport Department would be expected to run "dâks" or posting trains on the line of communication, which is very unsatisfactory work and is moreover an extravagant practice, as it uses up serviceable mules, which are required at the front and which cannot easily be replaced.

On the other hand the bullock tonga is not in such great demand on account of its slow, tedious pace, but it moves quite quickly enough for sick and convalescents who cannot walk.

Ambulance tongas for Cavalry and Horse Artillery.

Bullock tongas cannot, however, keep up with bodies of Cavalry and Horse Artillery when they are moving at a quick rate, and these troops might on field service be allowed mule tongas when they are moving independently, as men are sure to fall sick, and neither bullock tongas nor dandis could keep up with the force.

Covered 4-wheeled ambulances are supplied to hospitals in cantonments.

Camel panniers.

Camel panniers are fairly satisfactory, but the sick are exposed to the sun, the motion of the animal is very rough and the camels are frequently galled by the kajáwahs.

Riding mules and ponies.

Mules and ponies fitted with riding saddles are very useful for carrying sick men who are strong enough to ride.

A good riding saddle is necessary and one which will protect the spine. The rough saddles supplied in former campaigns have caused severe galls and sore backs.

Country carts.

When Indian country carts are used for sick transport, grass is liberally spread on the floor of the cart to prevent jolting as much as possible.

Chágals.

Chágals, or canvas water bags, are allowed on the following scale :—

To each dandi	2
To each ambulance tonga	2
To each riding mule or pony	1

(Para 262, Medical Field Service Code, India.)

A comprehensive treatise on the subject of ambulance transport would be beyond the scope of this lecture. It will be sufficient to detail the establishments and animals allowed for corps and hospitals for ambulance purposes in cantonments, on relief marches and on field service, and to state that ambulance bearers are, as regards pay, clothing, service, documents, discipline, etc., under the same rules as are detailed for transport establishments in Lecture XIII with this exception, that they are not attested and cannot in cantonments be dealt with under the Indian articles of war.

Caste of bearers.

It is laid down that bearers are to be of the Kahar caste, but in the Bombay Presidency bearers of the "Hamal" caste are also allowed to be entertained.

Scales of Ambulance Transport in Cantonments.

Bearers at out-stations are to be relieved every six months under the provisions of para. 2107, Vol. V, reconstructed by India Army Circular of 15th March 1892. They should be regularly instructed in carrying loaded dandis.

The various rules laid down in previous lectures for the care of animals and gear apply fully to ambulance transport, and as the transport animals attached to field hospitals on service are under the immediate control of the Medical Officer in charge, it would seem advisable that Medical Officers should be conversant with the general rules for the management of military transport for pack and draught work.

The following is a scale of dandis, etc., allowed to hospitals and corps in cantonments (para. 2102, Vol. V, A. R. I.).

Details.	Dandis with covers.	Field stretchers, War Office pattern.	Jhampan.	Bearers.	Wheeled ambulance. (*f*)
British Troops.					
Battery of Horse, Field, Heavy or Garrison Artillery	1	1	...	4	One per hospital in the plains of 50 beds or fraction thereof, and one for each additional 50 beds or fraction thereof. Garrison dispensary, Fort William, one.
Battery of Mountain Artillery	1	1	...	4	
Company of Royal Engineers	1	1	...	4	
Regiment of Cavalry or Battalion of Infantry	(*a*) 2	(*b*) 2	...	4	
Detached Wing of Cavalry or Infantry ...	(*a*) 1	(*b*) 1	...	4	
Hill Depôts — 1st class	1	...	(*c*) 1	4	
Hill Depôts — 2nd „	1	...	(*c*) 1	4	
Station hospitals — under 100 beds ...	1	...	...	4	
Station hospitals — 100 beds and upwards..	2	...	...	8	
Native Troops.					
Battery of Mountain Artillery	1	1	...	4	
Regiment of Cavalry or Battalion of Infantry	1	1	...	4	
Detached wing of cavalry or infantry ...	(*d*) 1	(*e*)	...	4	

(*a*) One in use and one in reserve with the corps, or in use with its wing if detached, in which latter case four additional bearers will be obtained from the Commissariat-Transport Department.

(*b*) The stretcher for the detached wing to be supplied from the corps allotment of two.

(*c*) Bengal and Bombay.

(*d*) The dandi and four bearers for the detached wing of native cavalry or infantry to be supplied by the Commissariat-Transport Department in addition to the dandi and four bearers allotted to the regiment or battalion.

(*e*) The stretcher allotted to a regiment of native cavalry or a battalion of native infantry to be used for the instruction of its detached wing.

(*f*) The stock of four-wheeled and those of two-wheeled Hawkes' pattern ambulance carts will, a they wear out, be replaced by tongas.

SCALES OF AMBULANCE TRANSPORT ON THE MARCH.:

Eight bearers are allowed for each jhampan between Kalka and the adjacent hill stations.

The scale of ambulance petty officers, called sirdars and mates, is as follows :

In cantonments	1 Sirdar	}	per every 100 bearers.
	2 Mates		
On command ...	1 Mate	for 26 to 50	,,
	1 Sirdar	„ 51 to 100	,,

When the number of bearers at a station is less than fifty, one of the bearers can be given the acting appointment of mate without extra pay.

Ambulance on the march.

The scale of ambulance transport allowed to corps and batteries on ordinary relief marches is as laid down in India Army Circular of March 1887, amended by Government of India letter, Military Department, No. 3506-D, dated 28th July 1892.

BRITISH TROOPS.

Ambulance transport is authorized for 3 per cent. on the strength of regimental warrant and non-commissioned officers and men, and will be supplied in the proportion of one-third Collis' dandis and two-thirds wheeled or animal carriage.

When the state of the roads admits of wheeled conveyance being used, field, *i. e.*, two-wheeled, ambulance carts (each capable of carrying four men sitting down) will be utilized, and in all other instances saddled ponies, *if procurable*, will be furnished for such men as may be well enough to ride, and additional Collis' dandis for the more serious cases.

NATIVE TROOPS.

Two Collis' dandis with covers are authorized for each regiment of cavalry or infantry, and one Collis' dandi with cover for each detached wing or detachment under the strength of a wing.

In addition to these, country carts or other wheeled or animal transport will be furnished to such extent as will accommodate 3 per cent. of sick on the strength of native commissioned and non-commissioned officers and soldiers.

GENERAL RULES FOR BRITISH AND NATIVE TROOPS.

In calculating the percentage of ambulance transport on strength of troops, fractional parts of 33 will reckon as 1 per cent.

Whenever circumstances render it necessary to employ country carts for the conveyance of sick, such carts will be furnished with covers to protect the patients from sun and rain and with straw for bedding ; the necessary accommodation will be calculated at six square feet per patient.

On the march of troops accompanied by sick, or of parties of British soldiers proceeding to and from hill depôts, and of detachments of invalids, extra carriage to the extent certified to be absolutely necessary by the medical officer in charge under the countersignature of the administrative medical officer will be supplied by the Commissariat-Transport Department, under the authority of the officer commanding the station, notified in Station Orders. If on the line of march the number of sick should necessitate the employment of additional ambulance transport, the officer commanding the corps may, on the

recommendation of the medical officer in charge, authorize the Commissariat-Transport Department to supply what is required.

Ambulance transport on field service.

On field service, corps, etc., are allowed ambulance carriage as shown below (Commissariat Field Service Code, para. 588) :—

DETAILS.	BRITISH TROOPS.									NATIVE TROOPS.								
	British Batteries of Royal Artillery.					Cavalry.		Infantry.		Battery of Artillery.	Co. Sappers & Miners.	Cavalry.		Infantry.		Engineers, Royal Field Park.	Telegraph Section, Sappers & Miners.	Ammunition column.
	Horse.	Field.	Heavy.	Garrison.	Mountain.	Regiment.	Wing.	Battalion.	Wing.			Regiment.	Wing.	Battalion.	Wing.			
Ambulance Transport.																		
Field dandis with chágals	1	1	1	1	1	2	1	2	1	1	1	1	1	1	1	1	1	1
Bearers	6	6	6	6	6	12	6	12	6	6	6	6	6	6	6	6	6	6
Field stretchers carried regimentally.	1	1	1	1	1	8	4	8	1	1	1	8	4	8	4	...	...	...
Carriage.																		
Mule or pony for panniers*	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	...	...	...

* If this mule or pony does not already form part of the obligatory transport of the corps (*vide* field service equipment tables), it will be supplied at the transport equipping depôt.

Ambulance transport for hospitals on field service.

The establishments of ambulance transport for hospitals on field service will be found as noted below :—

British Field Hospital ... Field Service Equipment Tables, Section XII.

Native field hospital for troops and followers. } Field Service Equipment Tables, Section XIII.

Field medical store depôts ... Field Service Equipment Tables, Section XIV.

Discipline of ambulance transport attached to hospitals on service.

The rules for the discipline of ambulance transport attached to field hospitals, payment of bearers and drivers and the returns required will be found in paras. 590 to 607, Commissariat Field Service Code, and it will be seen from these that a medical officer possessing some knowledge of transport work and the care of animals and gear will be able to exercise a wholesome supervision of the ambulance transport establishments placed under his control.

Appendix A.

SCALE OF DAILY LAND RATIONS FOR ARMY TRANSPORT CATTLE.

(Appendix 38, Vol. V, A. R. I.)

Cattle.	In Cantonment.						On Command.		At Graze.	
		Fodder.								
	Grain.	Dry.	Or Green.	Or Bhúsa.	Salt.	Oil.	Grain.	Fodder, Oil and Salt.	Grain.	Oil and Salt.
	Lbs.	Lbs.	Lbs.	Lbs.	Oz.	Oz.	Lbs.		Lbs.	
Elephants { First Class	15*	200	480	...	2	1	15		15	
Elephants { Second Class	15*	150	320	...	2	1	15		15	
Camels	4	25	40	20	⅛	...	6		2	
Mules { First Class 13 hands 2 inches and over	5	15	30	15	⅛	...	6		2½	
Mules { Second Class under 13 hands 2 inches	4	13	25	13	⅛	...	5		2	
Siege Train, Artillery and Departmental Bullocks	6	25	35	20	⅛	...	6		2	
Draught Bullocks	4	20	30	14	⅛	...	6		2	
Pack Bullocks	3	14	30	14	⅛	...	4		...	
Donkeys { First Class	3	13	25	...	⅛	...	4		...	
Donkeys { Second Class	2	10	20	...	⅛	...	3		...	

Same as in Cantonment.

Same as in Cantonment.

* Atta or Rice.

Elephants.—When dhán or paddy is given to elephants in lieu of rice or flour, the allowance is to be doubled. When paddy or rice is issued, 10 lbs. of grass are allowed per elephant per diem for tying up the grain in small bundles to prevent waste. Elephants with heavy batteries are to receive rations on the scale given in this appendix.

Mules.—Draught mules of whatever size are to be considered *first* class. The ordinary feed of 5 lbs. of grain allowed in Cantonment for draught mules may be increased to 6 lbs. on the authority of the Commissariat-Transport Officer when the mules are much worked. Pack mules, when much worked, are to be allowed an extra pound of grain on the authority of the Commissariat-Transport Officer.

Draught, Siege Train, Artillery and Departmental Bullocks.—One pound of grain additional may be allowed to draught, siege train, artillery and departmental bullocks when more than one half the cattle are continuously worked. This additional allowance may be given under the same conditions to pack bullocks employed in draught work.

All bullocks are allowed one pound of rock salt monthly in addition to the daily allowance of one-eighth ounce of common salt—to be placed before the animals to lick.

Camels.—White bhúsa is not to be given alone ; it must be mixed with at least one half of missa-bhúsa.

Unground barley is never to be issued to camels ; if ground barley is not procurable, gram or mote should be used.

Appendix B.

Appendix B.

Method of laying out Gear and Saddlery at Inspections. Notes for Inspections.

It is usual for Officers in charge of Transport to hold special weekly inspections of all animals, vehicles and gear, and it will be found that Monday morning is, as a rule, the most convenient time, as there is generally no work on Saturday afternoon and Sunday, and the drivers have time to get everything clean.

The following are suitable orders for inspections and might also be followed when regimental or depôt transport is inspected by General Officers Commanding, Commissaries General or Chief Commissariat Officers :—

" 1 (*a*). All mules to be harnessed up at pickets; feet cleaned and picked out.

" (*b*). Drivers cleanly dressed in uniform, each man standing to attention on " the right of his team of mules with his service book in his hand.

" (*c*). Draught mules—Traces hooked up to crupper ring of saddle.

" (*d*). Pairs of reins rolled up and hung on the off hind saddle hook of " near mule.

" (*e*). Connecting rod hung on near hind saddle hook of off mule.

" (*f*). Whip in driver's right hand.

" 2. Line gear to be laid out as follows :—

" I—Draught Mules.

" (*a*). Cart tarpaulin folded to 8′ × 6′ laid out behind the pair of mules.

" (*b*). Saddle tarpaulin folded to 8′ × 6′ laid on cart tarpaulin.

" (*c*). Two jhools each folded 18″ × 18″ laid in centre of saddle tarpaulin.

" (*d*). Two nose bags rolled and placed on the right of the jhools.

" (*e*). Four iron pegs laid out behind the nose bags.

" (*f*). Brush and curry-comb behind the iron pegs.

" (*g*). Cart rope coiled and laid out on the left of the jhools.

" (*h*). Canvas bucket standing in the centre of the coil.

" (*i*). Pair of forage nets and sickle laid out behind the cart rope.

" II—Pack Mules.

" (*a*). Reins of watering bridles drawn sufficiently tight to keep the mules' " heads up and to be fastened to front arch of saddle. Line gear for three " pack mules to be laid out as follows :—

" (*b*). Saddle tarpaulin folded to 6′ × 5′ and laid out behind the three " mules.

" (*c*). Three jhools, each folded to 18″ × 18″, laid close together in centre " of tarpaulin.

" (*d*). Three nose bags rolled and laid out on the right of the jhools.

" (*e*). Six iron pegs laid out behind the nose bags ; brush and curry-comb " behind the iron pegs.

"(*f*). Canvas bucket standing to the left of the jhools.

"(*g*). Pair of forage nets and sickle behind the bucket.

"*N.B.*—Iron pegs are to be laid out behind the mules only when they are "standing at permanent pickets. At other times the pegs are, of course, used "for picketing the animals.

"3. On the right of each troop the jemadar will lay out one pick, one "shovel, one pair of scissors, two hammers, and two line ropes."

Notes for inspections.

The following are some of the more important points for Transport Officers and others to notice at their periodical inspections :—

1. *Mules.*—See mules saddled up with all line gear laid out behind them.

2. Drivers in uniform with service books. Is uniform clean, properly marked and fairly well fitting, belts and buckles clean ? Note if books are complete, entries neatly made and not too much spread out. Is page 3 of books signed by the Transport Officer ? Are attestation papers completed and pasted in the service book ? Are the jemadars and duffadars intelligent looking and not too old ? (See Clothing, page 130 ; Service Books, p. 126 ; Attestation, p. 123 ; Petty Officers, p. 123.)

3. Walk round mules, noticing the following points :—

A. If saddlery is properly cleaned and in good repair and condition, chains and buckles clean. Are all buckles and straps opened out when saddlery is cleaned ? Is all leather soft and pliant ? (pp. 149, 150.)

B. Are the saddles properly placed on the mules' backs and are they properly fitted and stuffed with clean wool, not matted or lumpy ? Are the serge linings in good repair ? (pp. 156 and 157.)

C. Are the head collars in good repair and are they properly fitted ? (p. 78.)

D. Are the girths, bridles, breechings, breast-pieces and cruppers properly fitted ? (pp. 157 and 158.)

E. Is the fore and hind foot picketing gear in good order ? Are the pegs serviceable and are they driven in so that the head of the peg points away from the line of tension ? (p. 70.)

F. Is the shoeing properly attended to ? Are the heels open ? Are the feet kept to a reasonable length ? Have the smiths cut away any portion of the frog or bars with their knives ? Have they rasped the foot round to fit the shoe, instead of making the shoe fit the hoof ? Are the heels level ? (p. 139.)

Are the feet of pack mules (which are not shod) attended to, and are the rough edges rasped smooth to prevent the feet becoming broken by rough ground and stones ? (p. 141.)

G. Are the mules clipped when they have long coats ? Are they properly groomed ? (p. 76.)

H. Are the standings smooth and well kept and are all the surroundings thoroughly clean ? (p. 69.)

NOTES FOR INSPECTIONS OF TRANSPORT.

I. Is any arrangement made to use waste forage for bedding? When told that this cannot be done, it is a sure sign that litter is taken away by cow-men early in the morning. Very little bedding serves to keep the animal off the ground and prevent his coat being fouled with mud or dirt (p. 75).

J. Are entire remount mules castrated on the first opportunity?

4. Order jhools to be opened out, mules to be unsaddled and saddles to be placed upright on the jhools. Now notice—

A. If the jhools are in proper repair with cruppers and belly bands (p. 78.)
Are the drivers taught to execute slight repairs themselves to their jhools and nose bags? (p. 198.)

B. Are the linings of the saddles in good order and not hardened with dirt and sweat? Is the stuffing carefully looked after and is the wool of good quality? (p. 156.)

C. Are brushes, sickles, forage nets, canvas water buckets, clippers, and scissors in good order, in accordance with sealed patterns and fit for field service? (p. 72.)
Is all saddlery, gear and clothing properly marked? (pp. 130, 149.)

D. Are the mules in good condition and filled up over the ribs, loins and quarters?

E. Is the grain well crushed and mixed with chaff when procurable?
Is salt put into each mule's feed?
How many times a day are the mules fed? (p. 79.)

F. When mules are poor, what steps are taken to bring them into condition? (pp. 68-69 and 76—80.)
Are old mules' molar teeth rasped to enable them to masticate their food properly? (pp. 57, 87.)
When young animals are poor, do they get tonics, green fodder and well crushed grain? (p. 98.)

G. Are the animals regularly worked? (p. 223.)

H. Are there any standing rules for drawing and issuing the grain and fodder so as to prevent the possibility of its being pilfered (pp. 79, 80).

Establishments.

5. Can Officers, British subordinates and native agents age mules and bullocks and detect unsoundness and sickness?

6. Do they read, and have they in their possession, any standard works on military transport, stable management, manufacture of carts and harness, traction, etc.?
Do they do their best to make themselves proficient in these matters?
Can they name any books they have read on these subjects? (pp. 6—9.)

7. Do they know the names of the different parts of harness and saddlery, carts and wheels? (pp. 146—148 and 162—166.)

8. Are transport agents well instructed in practical work, so that they will be fit to take charge of animals and carts on the march? (p. 123.)

NOTES FOR INSPECTIONS OF TRANSPORT.

9. Do jemadars and duffadars understand fitting of saddlery and loading? (pp. 146—148 and 171—186.) Do they read the vernacular transport books published (p. 9.)

Workshops.

10. Do Officers, British subordinates and native agents understand the use of the various artificers' tools, and can they discriminate between good and bad work and different qualities of thread, serge, leather, wood, iron and steel, etc.? Is there a proper system of supervision over the workshops (pp. 189-203.)

Sick stables.

11 (*a.*) Are salutris efficient? Can they use the clinical thermometer? Do they know symptoms of disease and are they acquainted with ranges of temperature in different animals? (pp. 82—85 and p. 123).

(*b*). Can they be trusted to make up prescriptions and perform simple operations, such as blistering and castration?

(*c*). Are medicines, especially opium, kept under lock and key? Is the pharmacy tidy and clean? Are the sick stables kept scrupulously clean? Are the veterinary appliances kept clean.

Carts.

12. Are all carts in thorough repair, wheels tight and all nuts screwed up?

Are curricle bars securely attached to poles? Take a wheel off and see if either pipe-box or axle-arm are worn (pp. 162—164).

Are drivers of draught mules instructed in driving their carts with safety to themselves and the general public? Is there any system of driving instruction? (pp. 166-169.)

Ambulance.

13. Are bearers efficient and have they got complete uniform? Are their books complete? Do they know stretcher drill?

Are they regularly instructed in carrying loaded dandis? Are all dandis and ambulance vehicles in good repair?

Transport training.

14. Are orders regarding transport training classes strictly carried out? (G. O. 46 of 1st May 1890 and letter of Quarter Master General in India No. 545 of 11th February 1892 and Government of India Military letter No. 565-D, dated 8th February 1892). (pp. 220—222).

Followers' Lines.

18. Are they clean, in good repair and reserved solely for departmental establishments?

Transport Line Office.

19. Are the regulation books and files kept up to date (pp. 219—224).

20. Is every endeavour made to do away with unnecessary correspondence between the Commissariat-Transport Office and the Transport Lines?

Drill equipment.

Is the necessary equipment for instruction in loading drill, etc., kept complete? (p. 171).